

Catalogue of the Ophiuroidea (brittle stars, Phylum Echinodermata) collected by the IN2021_V04 and IN2022_V08 expeditions to the Australian Christmas Island and Cocos (Keeling) Islands Territories

Timothy D. O'Hara

Museums Victoria, GPO Box 666, Melbourne, Victoria 3001, Australia [tohara@museum.vic.gov.au]

<https://orcid.org/0000-0003-0885-6578>

Abstract In this catalogue, 80 species of ophiuroids collected by the IN2021_V04 and IN2022_V08 expeditions to the Australian Christmas Island and Cocos (Keeling) Islands Territories are described and illustrated.

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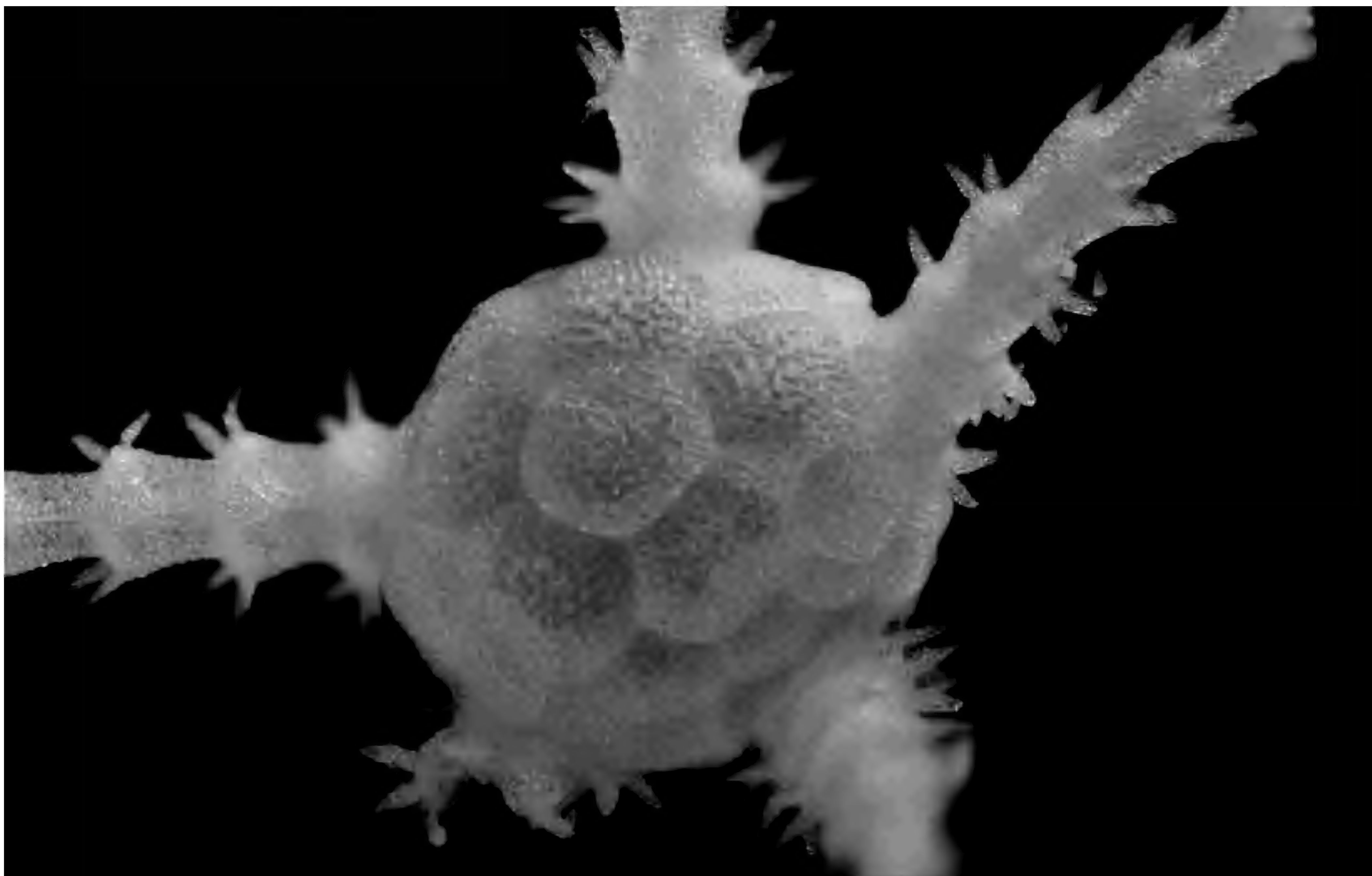


Figure 1. *Ophiomastus* sp. MoV 7351.

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Introduction

This is a catalogue of the Ophiuroidea (brittle stars, phylum Echinodermata) collected by the IN2021_V04 and IN2022_V08 expeditions to the Australian Christmas Island and Cocos (Keeling) Islands Territories—Australia's Indian Ocean Territories (IOT). The catalogue includes 80 taxa that can be identified to species-level.

The collection is primarily from bathyal (200-3500 m) depths, with a few samples collected from shallow waters, around the islands and Muirfield seamount, and a few from the abyssal plain. Depth terms used in this catalogue include 'shelf' (0-200 m), 'upper bathyal' (200-1000 m), 'mid bathyal' (1000-2000 m), 'lower bathyal' (2000-3500 m), and 'abyssal' (>3500 m). The samples were primarily collected by beam trawl from soft (sand to mud) substrata, but a few samples were collected from hard ground using a heavy epibenthic sled.

The collection has been primarily identified using morphological characters. However, DNA sequences have been obtained from many species from our exon-capture process (416 nuclear genes and the mitochondrial COI gene, 280 kb in total) (Hugall *et al.*, 2016; O'Hara *et al.*, 2017). The full tree containing 2500 samples will be published separately to this catalogue. The latest published tree with 945 samples was published in Christodoulou *et al.* (2019) but occasionally unpublished genetic data is referenced if this was crucial in the determination of species identity.

The taxonomy of ophiuroids is stable at family-level and higher (O'Hara, 2017; O'Hara *et al.*, 2018) however, many existing 'genera' are polyphyletic and require a family by family revision. Numerous 'species' are now considered species-complexes with several distinct genetic clades.

Methods

Station details and collection methods are described in O'Hara (2024).

Ophiuroid morphology is illustrated in Stöhr *et al.* (2012) and O'Hara (2017). Abbreviations include dd – disc diameter, DAP – dorsal arm plate, LAP – lateral arm plate, and VAP – ventral arm plate.

Systematic account

Order Euryalida

Family Asteronychidae

Asteronyx reticulata Okanishi, Sentoku, Martynov & Fujita, 2018

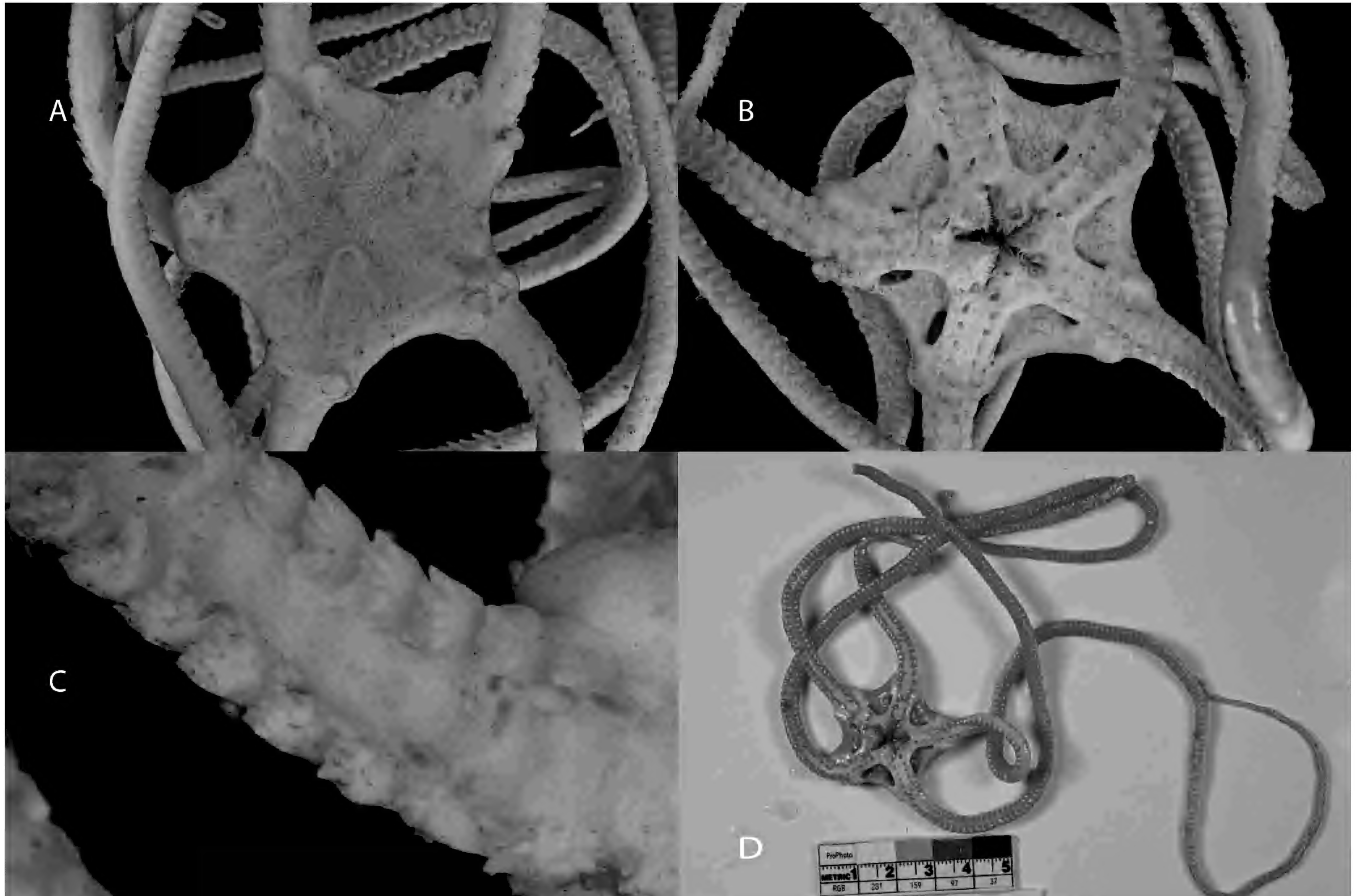


Figure 2. *Asteronyx reticulata*. (A-D) NMV F305585 (Op 5, 28 mm dd), (A) dorsal, (B) ventral, (C) arm (arm spines embedded in skin), (D) live colour.

Description of IOT material Disc to 28 mm dd, covered in skin embedded with mesh-like ossicles and covering bar-like radial shields, multiple columns of spiniform teeth papillae and numerous oral papillae, genital slit continues for 2 arm segments, does not reach disc margin, no genital papillae, basal arm not swollen (no gonads or digestive organs in arm), arm spines hooked, < 1 seg in length, not elongated distally, generally embedded in skin.

Taxonomic remarks The widespread species *A. loveni*

contains several genetic clades, one of which was described from southern Japan recently as *A. reticulata*. DNA evidence indicates that this species occurs in the IOT.

Distribution East China Sea (339–1150 m), IOT (643–997 m).

Ecology and life history Epizoic. The closely related species *A. loveni* has large eggs (to 0.8 mm dia) indicative of a lecithotrophic larvae.

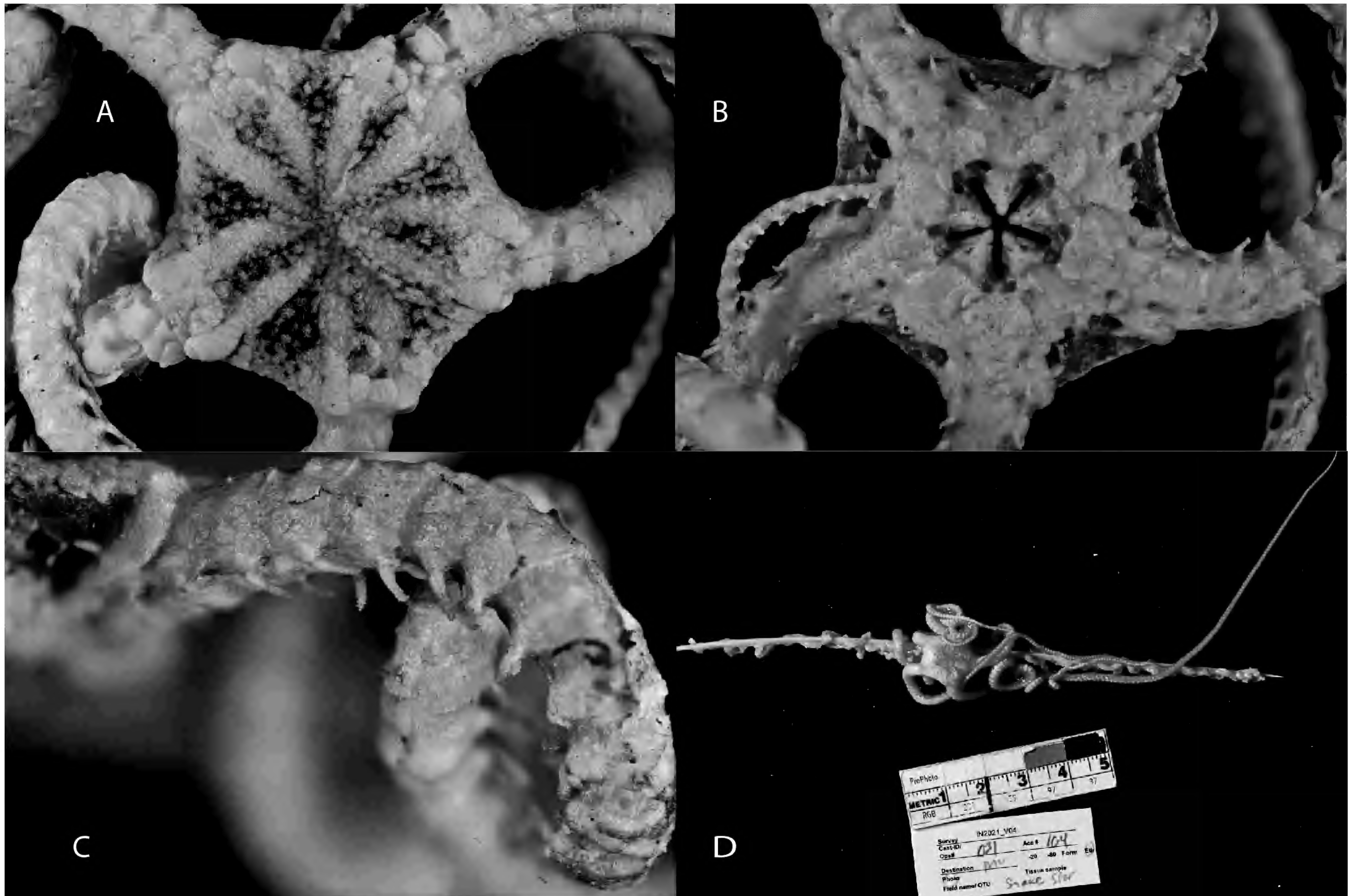


Figure 3. *Astrodia duospina*. (A-C) NMV F305622 (Op 26, 8 mm dd) dried, (A) dorsal, (B) ventral, (C) arm. (D) NMV F305535 (Op 31, 12 mm dd) live colour, on seapen.

Description of IOT material Disc to 14 mm in diameter, raised high above the arm. Plate-shaped external ossicles on the centre and periphery of dorsal disc surface. Radial shields obvious, narrow, longer than wide. Teeth triangular, oral papillae indistinct or underdeveloped. Genital slits short, approximately one-fourth of the height of the disc. Arms slender and long, not expanded basally with gonads or stomach extensions, no girdle hooklets. Lateral arm plates crescent-shaped and not projecting. Two arm spines ventrolaterally, not

hooked at tip. Red colour when alive.

Taxonomic remarks The IOT specimens fall within the mitochondrial clade that defines this recently described species (Xie *et al.*, 2022).

Distribution Tropical East-Indo-West Pacific (1175–3345 m); IOT (1175–3345 m).

Ecology and life history Both the type and the IOT specimens were collected living on (unidentified) seapens on seamounts.

Family Euryalidae

Asteroschema horridum Lyman, 1879

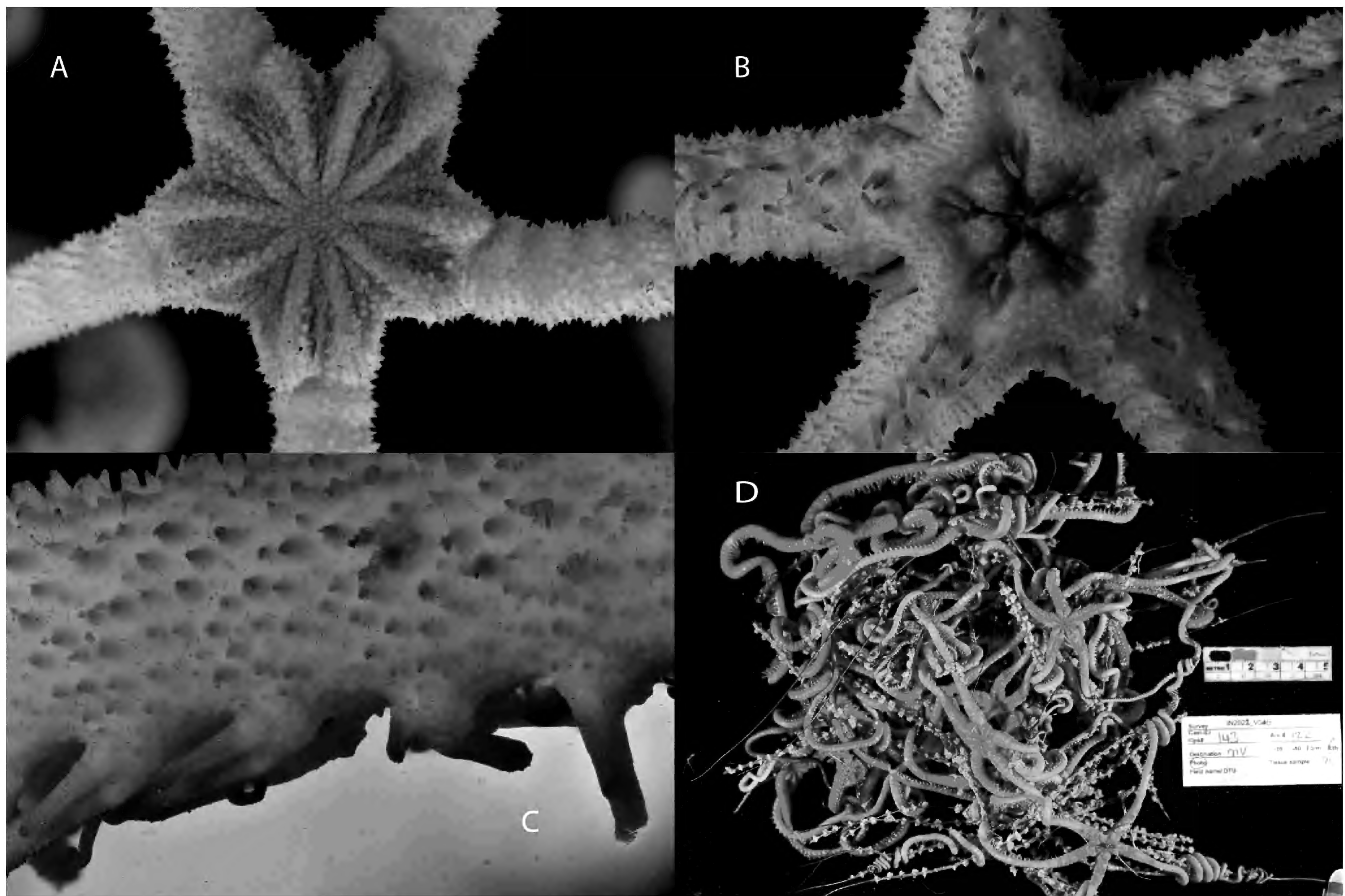


Figure 4. *Asteroschema horridum*. (A-C) NMV F305583 (Op 5, 11 mm dd) preserved, (A) dorsal, (B) ventral, (C) arm. (D) NMV F308060 (Op 143, to 16 mm dd) live colour, on octocoral.

Description of IOT material Disc to 15 mm dd, disc and arms covered in plates with conical tubercles terminating in a blunt rounded or minutely thorny tip, two ventrolateral arm spines, the inner one starting at the first segment, the smaller outer one at the 4th segment, becoming hook-like distally.

Taxonomic remarks These specimens agree with the holotype of *O. horridum* (12 mm dd) which has up to 14 expanded segments that gradually taper from a broad arm base. Several other similar species have been recorded from the Indonesian region. The holotype of *Asteroschema tumidum* differs in having only 3 expanded segments at the base of the arms. However, it is also much smaller (7-8 mm dd). *Asteroschema fastosum* has 5-7 expanded segments at 12 mm dd. The lectotype (10 mm dd) of *Asteroschema ferox* has 14 segments that taper from a broad base. Other non-type specimens of *A. ferox* reported by Koehler (1930) have 1-2 expanded segments at 6 mm dd, and those reported by Guille (1981) have up to 6 expanded segments at 9 mm dd. A comparison of the 15 individuals in lot NMV F308060

(Op 143, graph) shows a weak relationship between number of expanded arm segments and disc diameter, and much individual variation. Thus, the number of expanded arm segments is not a clear diagnostic character to separate species.

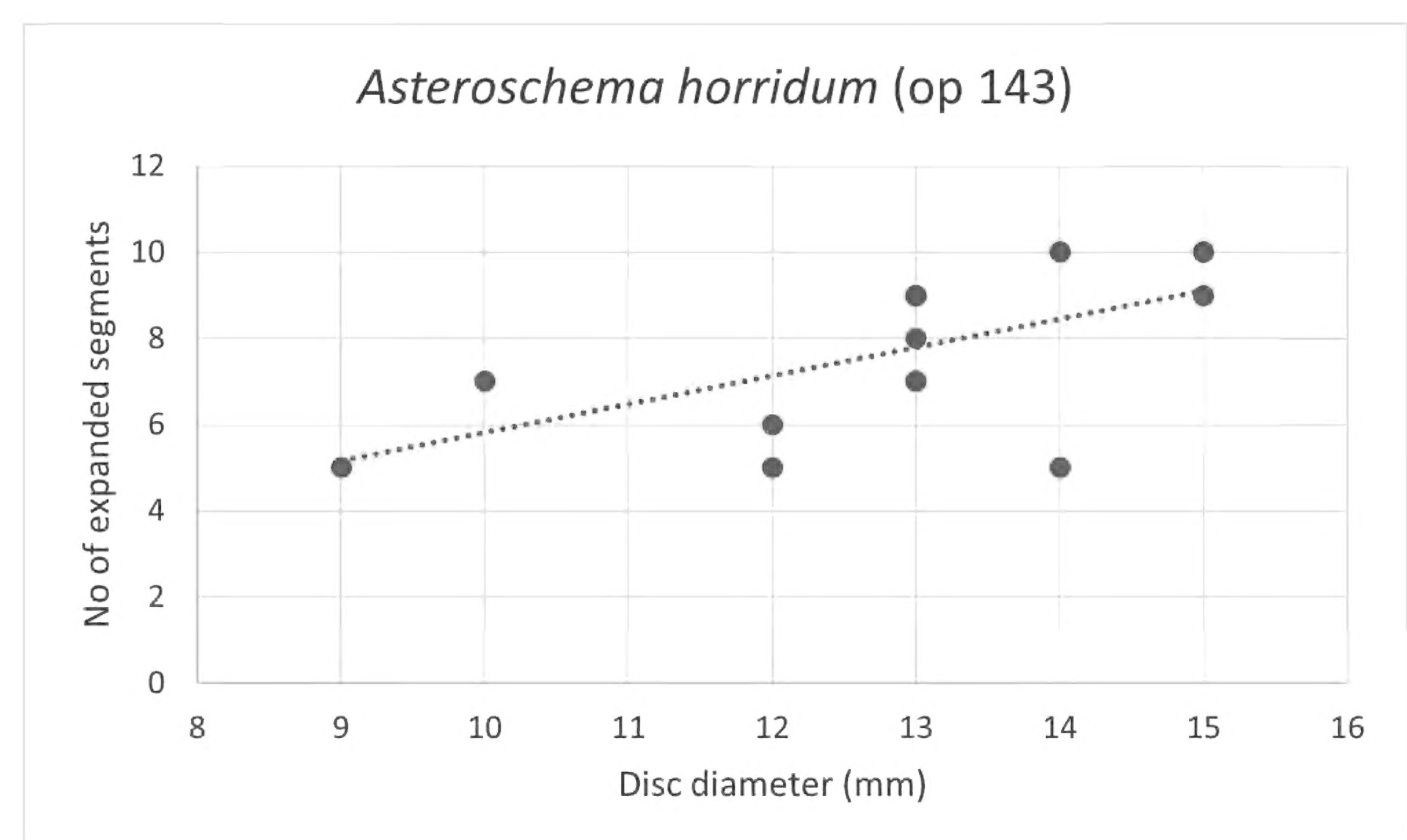


Figure 5. *Asteroschema horridum* - plot of expanded segments versus disk diameter. Specimens from operation 143.

Distribution Tropical Indo-West Pacific, from Reunion to Moorea, Japan to the Tasman Sea (33°S to 31°N) (395–1550 m). IOT records (643–1343 m). **Ecology and life history** Epizoic.

Asteroschema cf. *igloo* Baker, 1980



Figure 6. *Asteroschema* cf. *igloo*. (A-D) NMV F305590 (Op 48, 9 mm dd), (A) dorsal, (B) ventral, (C) arm, (D) live colour, on octocoral.

Description of IOT material Disc 11 mm dd, disc and arms covered in low domed plates, two ventrolateral arm spines, the inner one starting at the second segment, the smaller outer one at the 5th segment, becoming hook-like distally.

Taxonomic remarks The IOT specimen is the largest specimen and deepest known record of this species, and the only one recoded from the Indian Ocean. It

also differs in having arm spines starting nearer the disc than the type series (outer spine from segment 3 and the inner spine from segment 8-10).

Distribution East Indian and SW Pacific Oceans, from latitude 30° to 9°S (395–1347 m). IOT records (1260–1347 m).

Ecology and life history Epizoic.

Ophiocreas oedipus Lyman, 1879



Figure 7. *Ophiocreas oedipus*. (A-B) NMV F305598 (Op 26, 10 mm dd), (A) dorsal, preserved, (B) live colour, on octocoral.

Description of IOT material Disc 10 mm dd, skin and arm epidermis without plates or granules, radial shields bar-like separate, arms swollen for first 2-3 segments, 2 arm spines, inner one club-like and as long as an arm segment. Live colour reddish, purplish when preserved in ethanol.

Taxonomic remarks This species is separated from the closely related *O. ajax* by the number of swollen arm segments basally, with the latter having 6-9. *Ophiocreas ajax* is also generally occurs shallower (<1000 m) than *O. oedipus* in the SW Pacific.

Distribution Widespread at tropical and temperate

latitudes (43°S to 33°N) across the Atlantic, Indian and Pacific Oceans to Hawaii (355–2320 m, although shallow records need re-examination). IOT records (1 specimen, 1915–1990 m).

Ecology and life history In the North Atlantic, this species is an obligatory epizoic on the gorgonian *Metallogorgia melanotrichos* (Mosher & Watling, 2009). *Ophiocreas ajax* from New Caledonia is epizoic on a morphologically similar gorgonian *Pseudochrysogorgia bellona* (Cook *et al.*, 2023).

Order Ophiurida

Family Astrophriuridae

Ophiophycis cf. gracilis Mortensen, 1933

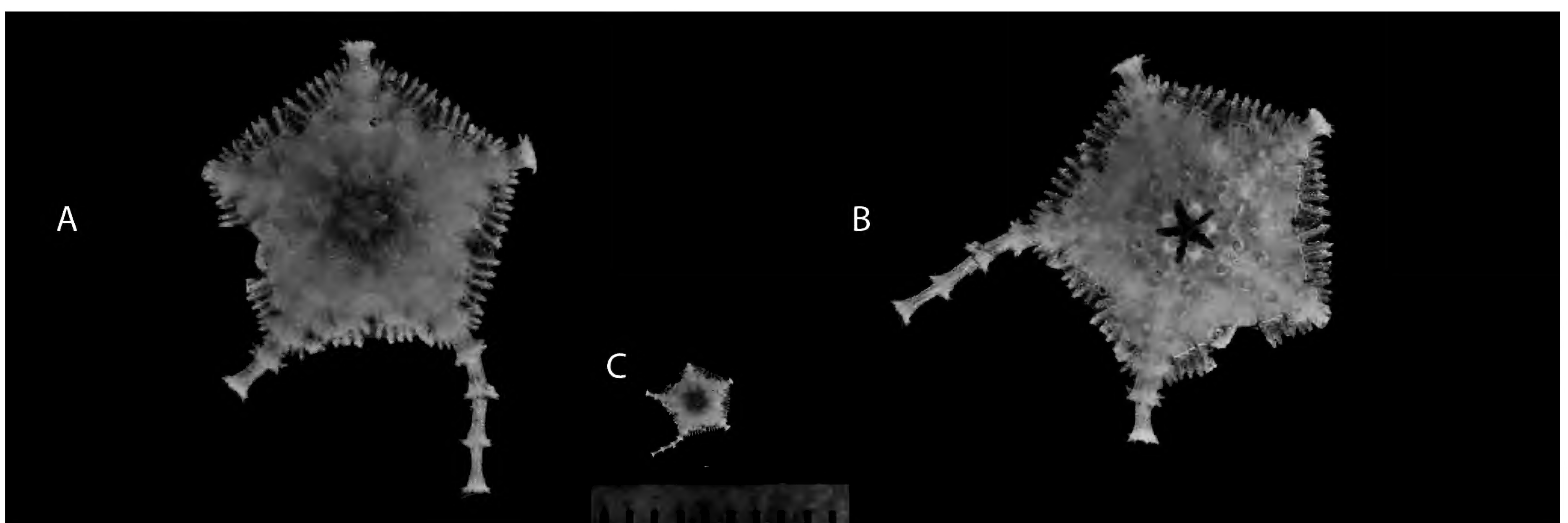


Figure 8. *Ophiophycis cf. gracilis*. NMV F308102 (Op 163, 2 mm dd) preserved (most arms broken), (A) dorsal, (B) ventral, (C) whole body.

Description of IOT material Disc to 2 mm dd, centrodorsal plate star-shaped, other plates not tuberculated, radial shields contiguous, separated distally by the first dorsal arm plate; three pairs of basal lateral arm plates expanded, all extending to margin, but not fusing together to form a continuous disc, with three long pointed to clavate arm spines forming a fringe; free arm at least 5 segments long, slender, with 2-3 small hook-shaped arm spines; 4 pairs of tube feet under disc, with 1-2 rim-like tentacle scales.

Taxonomic remarks Within *Ophiophycis*, only *O. gracilis* and *O. gloriensis* have the first lateral arm plate that extends to the disc margin. The IOT specimens are closest to *O. gracilis*, having one dorsal arm plate separating the radial shields distally and pointed arm

spines around the disc. But both species have pentagonal centrodorsal plates rather than the star-shaped structure on the present material. More research is needed to determine species boundaries in this genus and with the relationship to species of *Ophiomisidium*. Other researchers have reported notable morphological changes with growth within these genera (Schoener, 1969), and some "species" may be juveniles of others.

Distribution *Ophiophycis gracilis* is only known from the type series, found off St Helena in the Atlantic Ocean (280–480 m); IOT (404–528 m).

Ecology and life history *Ophiophycis gracilis* was reported from rocky substrata, protecting young under the disc (Mortensen, 1933).

Family Ophiomusaidae

Ophiomusa facunda (Koehler, 1922)

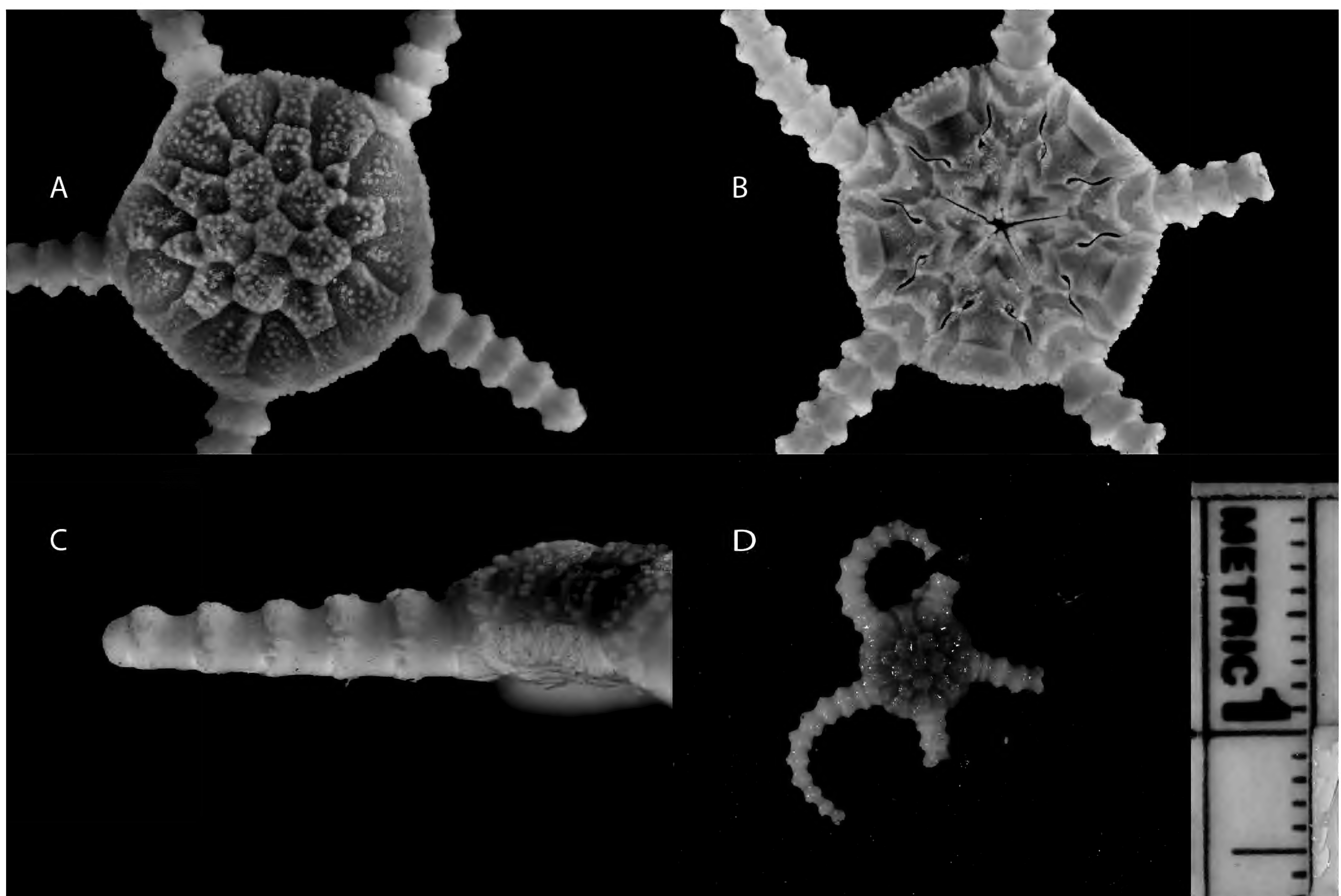


Figure 9. *Ophiomusa facunda*. (A-C) NMV F308106 (Op 165, 10 mm dd) dried, (A) dorsal, (B) ventral, (C) arm. (D) NMV F308105 (Op 161, 5 mm dd) live colour.

Description of IOT material Disc to 10 mm dd, arms short and robust, disc covered in thick granulated plates, radials granulated, contiguous, separated inter-radially by a row of 2 marginal plates, ventral disc has

only a single wide plate with a granulated margin, contiguous with the oral shield, no dorsal arm plates (or a few minute ones) and 2 ventral arm plates (including the one terminating the jaw slit) with small circular

tentacle scales, lateral arm plate swollen, 4 arm spines, lowest 2 together, upper two a little separated.

Taxonomic remarks *Ophiomusa granosa* has a second ventral disc plate between the marginal one and the oral shield; *O. miranda* (Indonesia) and *O. anisacantha* (S Australia) have a wide ventral disc plate with a smooth

margin and no granules on disc plates.

Distribution SW Pacific from Papua New Guinea to northern New Zealand, Indonesia-Philippines, South China Sea, Eastern Africa (150–1600 m); IOT (527–695 m).

Ophiomusa fallax (Koehler, 1904)

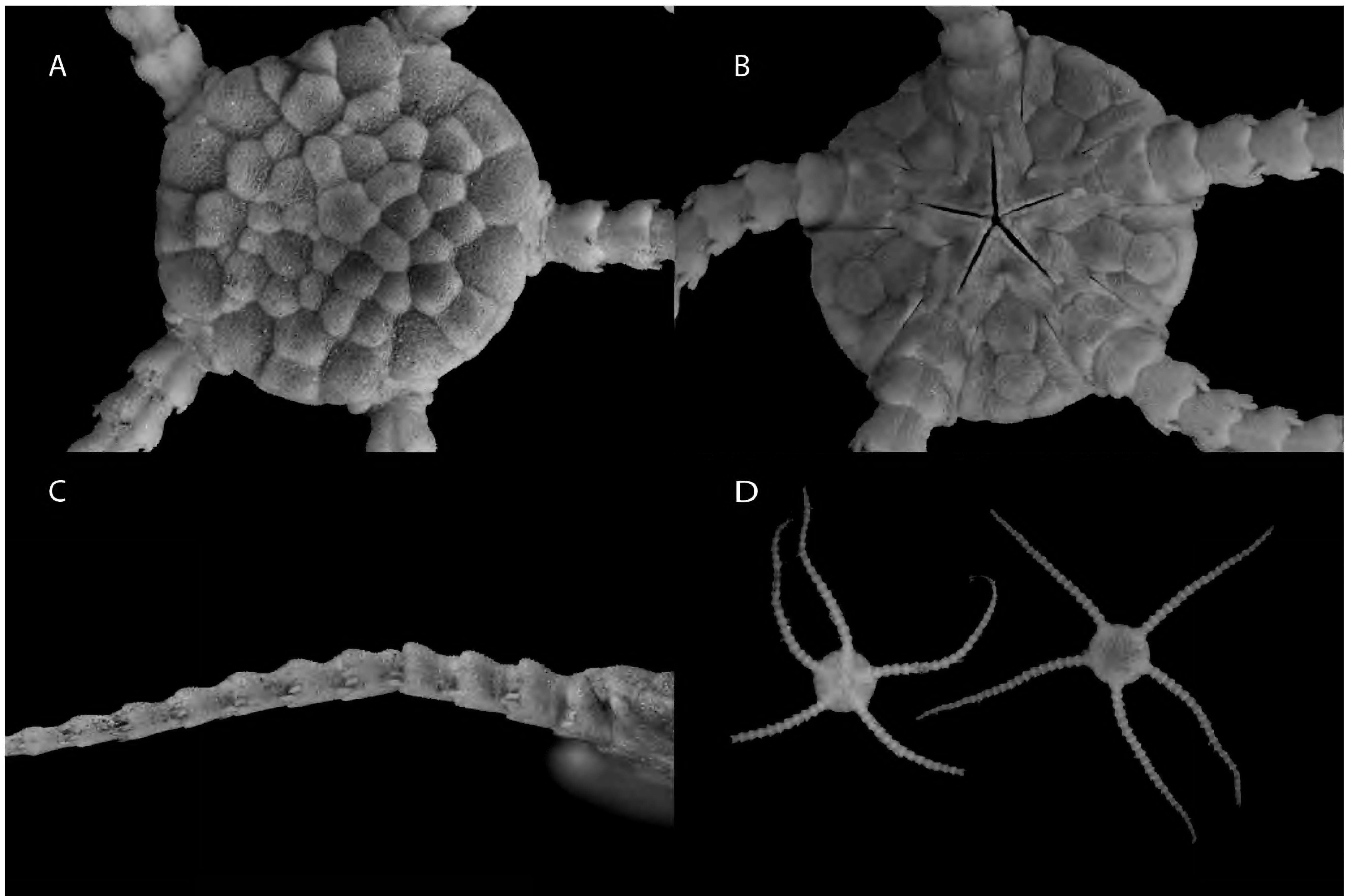


Figure 10. *Ophiomusa fallax*. NMV F305624 (Op 5, 4 mm dd) dried, (A) dorsal, (B) ventral, (C) arm. (D) NMV F308041 (Op 128, 4.5 mm dd) live colour.

Description of IOT material Disc to 55 mm dd, arms long and slender, disc covered in thick imbricating plates, radials and marginal plates forming a rim to disc, ventral disc has 3 plates, one contiguous with the oral shield and two on the margin, no dorsal arm plates (or a few minute ones) and 2 ventral arm plates (including the one terminating the jaw slit), no obvious pores for tube feet, lateral arm plate swollen, 3 arm spines, lowest to 1/3–1/4 segment in length, middle one becoming hooked distally. Tiny specimens can have open tentacle pores on the first segment. Live disc colour orange-pink.

Taxonomic remarks One of the few *Ophiomusa* species to lack obvious tentacle pores on the first 2 segments as adults. Similar species include *O. kimblae* from Queensland which has a single ventral marginal plate and *O. incerta* from SE Australia which has 2 tuberculated marginal ventral disc plates. *Ophiomusa incerta* can also have pores for tube feet on juveniles that close with growth (O'Hara, 1990).

Distribution East Indo-West Pacific species, from southern Japan to New Caledonia, the IOT to Moorea (mostly 200–1000 m, the few records out of this range this need confirmation). IOT records (376–997 m).

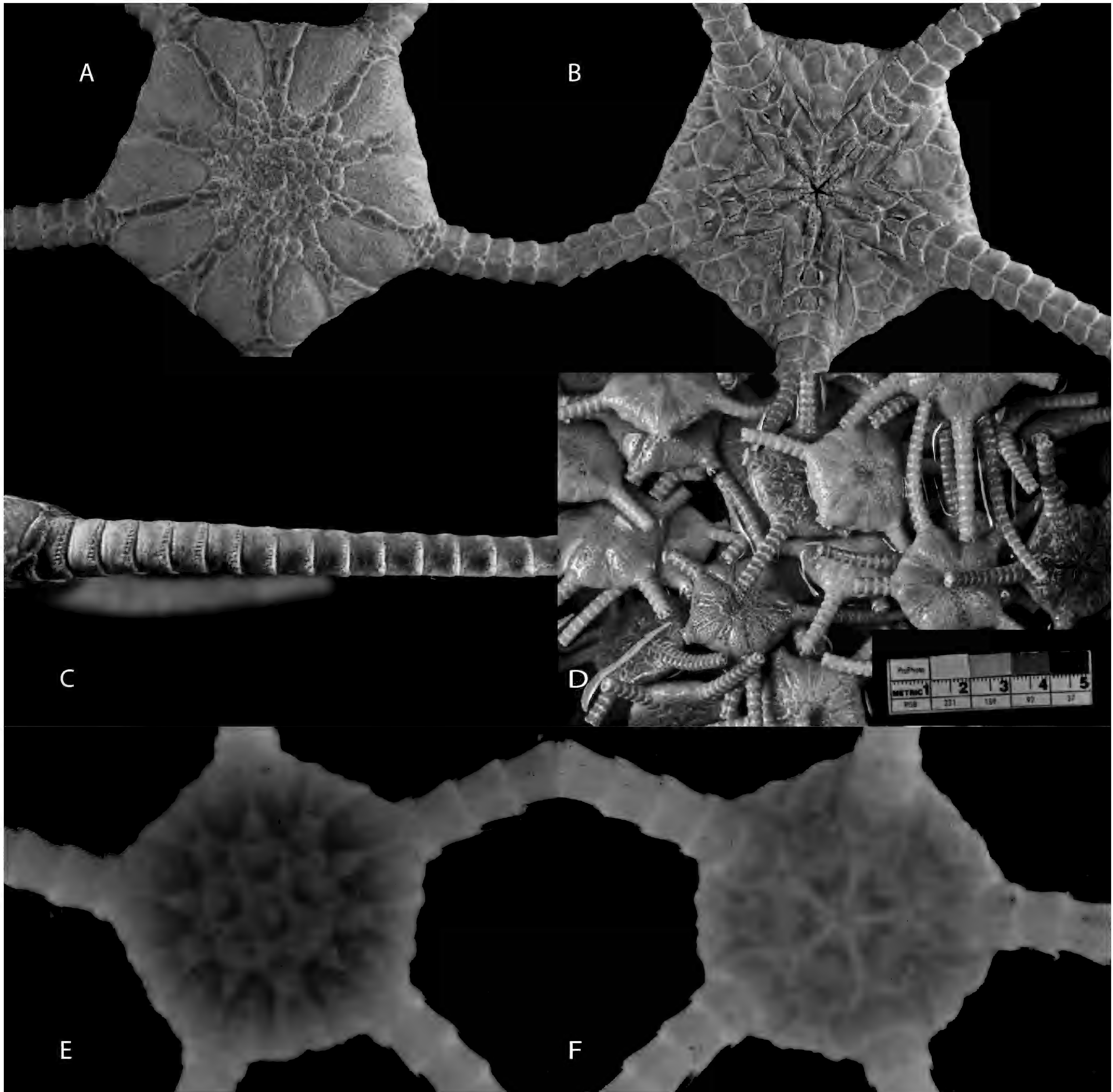
Ophiomusa lymani (Thomson, 1873)

Figure 11. *Ophiomusa lymani*. (A-C) NMV F305611 (Op 26) dried, (A) dorsal, (B) ventral, (C) arm. (D) NMV F305531 (Op 26) live colour. (E-F) NMV F305532 (Op 26) juvenile, (E) dorsal, (F) ventral.

Description of IOT material Disc to 27 mm dd, radial shields large, granulated, numerous plates along the ventral disc margin, dorsal arm plates tiny, only 3 ventral arm plates, the first forming the boundary of the jaw, 2 pairs of observable elongated tentacle pores, partially protected by a scale on the lateral arm plate, numerous small arm spines on adult specimens. Live colour: light brown.

Taxonomic remarks A genuine widespread species. Juveniles have only 3 arm spines and few ventral disc

plates but can be typically distinguished by the partially granulated radial shields.

Distribution Bathyal species from all tropical and temperate oceans, from 50S to >60N (in the Atlantic) (600–4829 m). IOT records (1175–2021 m). Records from depths shallower than 600 m and deeper than 3500 m require re-examination.

Ecology and life history Soft sediment species, dense abundance in some locations, can leap and swim if disturbed. It covers its arms in mucus and raises them

to filter feed. Grows rapidly, the disc reaching 12 mm in the first year. The large (0.4 mm) eggs presumably

develop into lecithotrophic larvae (O'Hara, 2017).

Family Ophiopyrgidae

Amphiophiura bullata (Thomson, 1877)

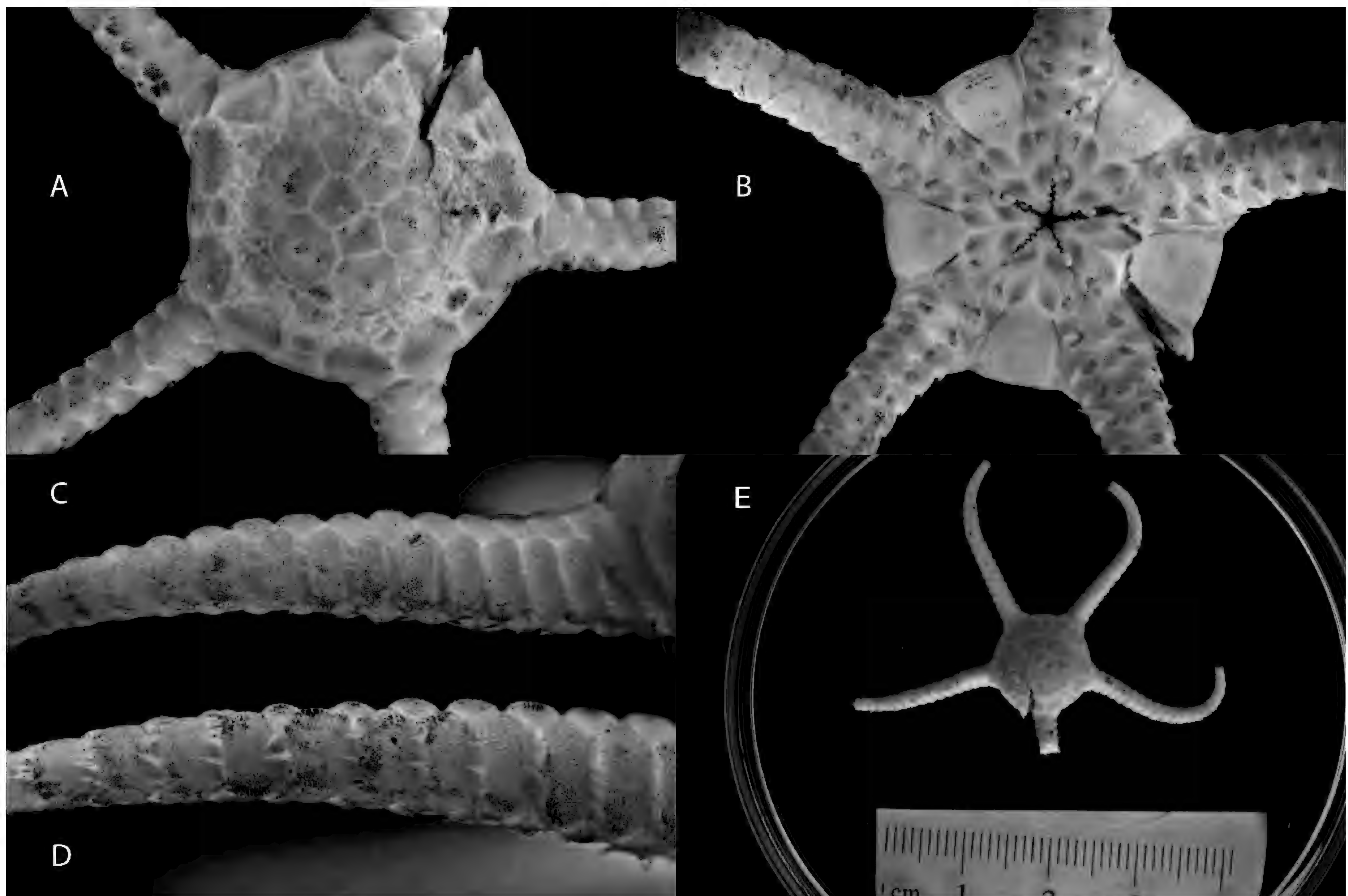


Figure 12. *Amphiophiura bullata* (A-E) NMV F307639.4 (Op 122), (A) dorsal (broken on the upper right), (B) ventral (broken on the lower right), (C) proximal arm, (D) distal arm, (E) whole body.

Description of IOT material Thick disc to mm dd, prominent primary plates, sometimes surrounded by a narrow ring of smaller scales, large wide marginal plate; radial shields oval, contiguous distally; spiniform arm comb papillae, large oral shield covering almost the entire ventral disc surface, adoral shields are placed proximal to oral shields; three short, spaced arm spines. Colour white.

Taxonomic remarks The traditional division of this species into subspecies (*bullata*, *convexa* & *vitjazi*) based on the degree of disc plate fragmentation (Paterson 1985) is not supported by genetic evidence (Stöhr &

O'Hara, 2021). However, there is genetic evidence of a geographical split between abyssal North central Pacific (*convexa*) and other abyssal (Atlantic, Southern Ocean, Southern Indo-Pacific) populations (Stöhr & O'Hara, 2021). The IOT sequences cluster with the latter group, *Amphiophiura bullata*. In addition, less common bathyal populations individuals form a separate genetic clade – see next species.

Distribution North and South Atlantic, Indian Ocean, South-West Pacific, western Southern Ocean, IOT (4980–5431 m).

Ecology and life history Soft sediment dweller.

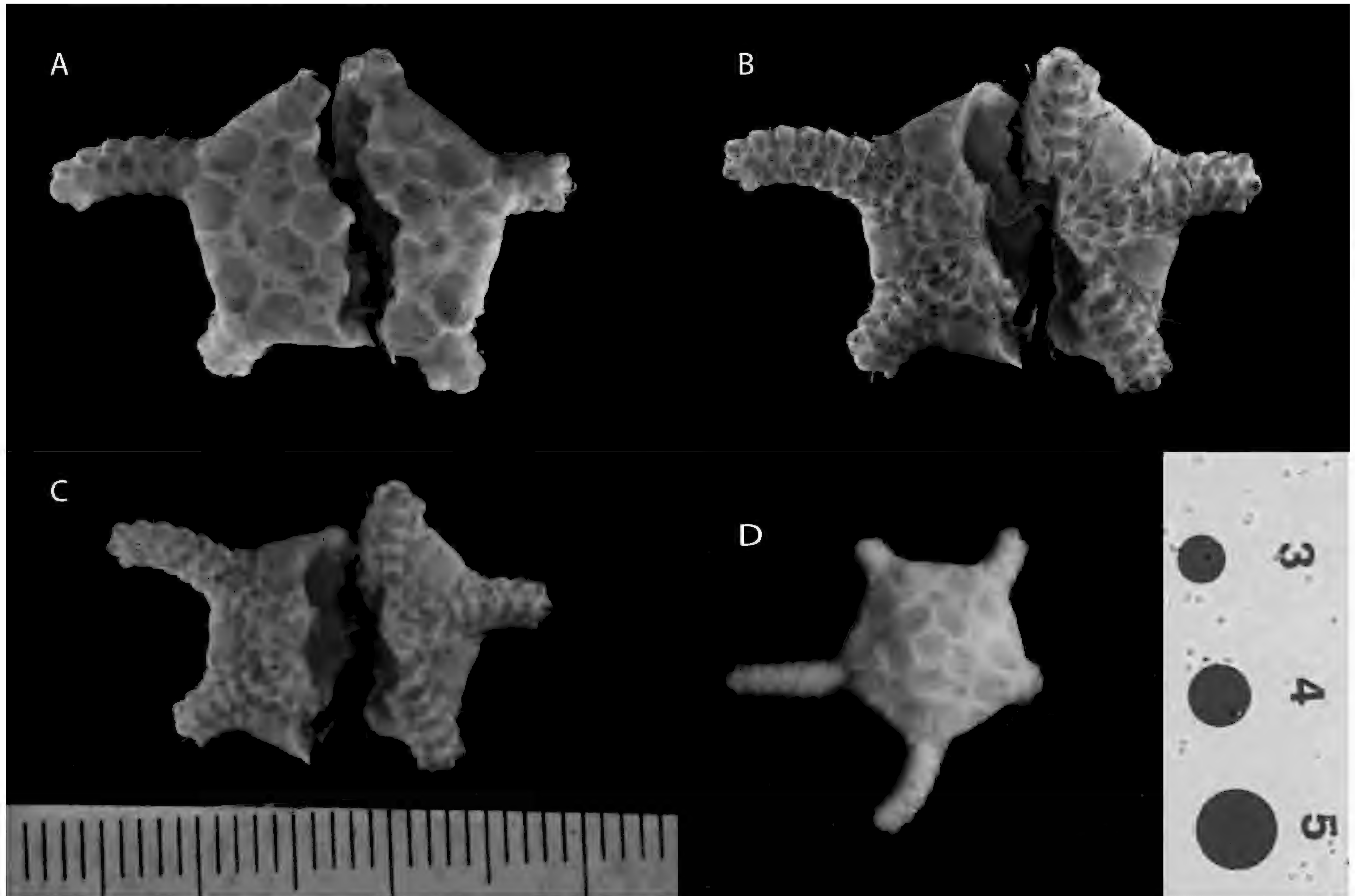
Amphiophiura sp.MoV.7343

Figure 13. *Amphiophiura* sp.MoV.7343 (A-D) NMV F307630 (Op 108, 12 mm dd) disc split, (A) dorsal, (B) ventral, (C) ventral with scale bar, (D) live colour (circles in mm).

Description of IOT material Disc to 12 mm dd, prominent primary plates, sometimes surrounded by a narrow ring of smaller scales, large wide marginal plate; radial shields oval, contiguous distally; spiniform arm comb papillae, large oral shield covering almost the entire ventral disc surface; adoral shields are placed proximal to oral shields; three short, spaced arm spines;

dirty white colour.

Taxonomic remarks Bathyal Indo-Pacific individuals of *Amphiophiura* 'bullata' form a separate genetic clade to the abyssal samples.

Distribution Taiwan (1713–1624 m), New Caledonia (1686–2155 m), IOT (1355–1451 m).

Ecology and life history Soft sediment dweller.

Amphiophiura insolita (Koehler, 1904)

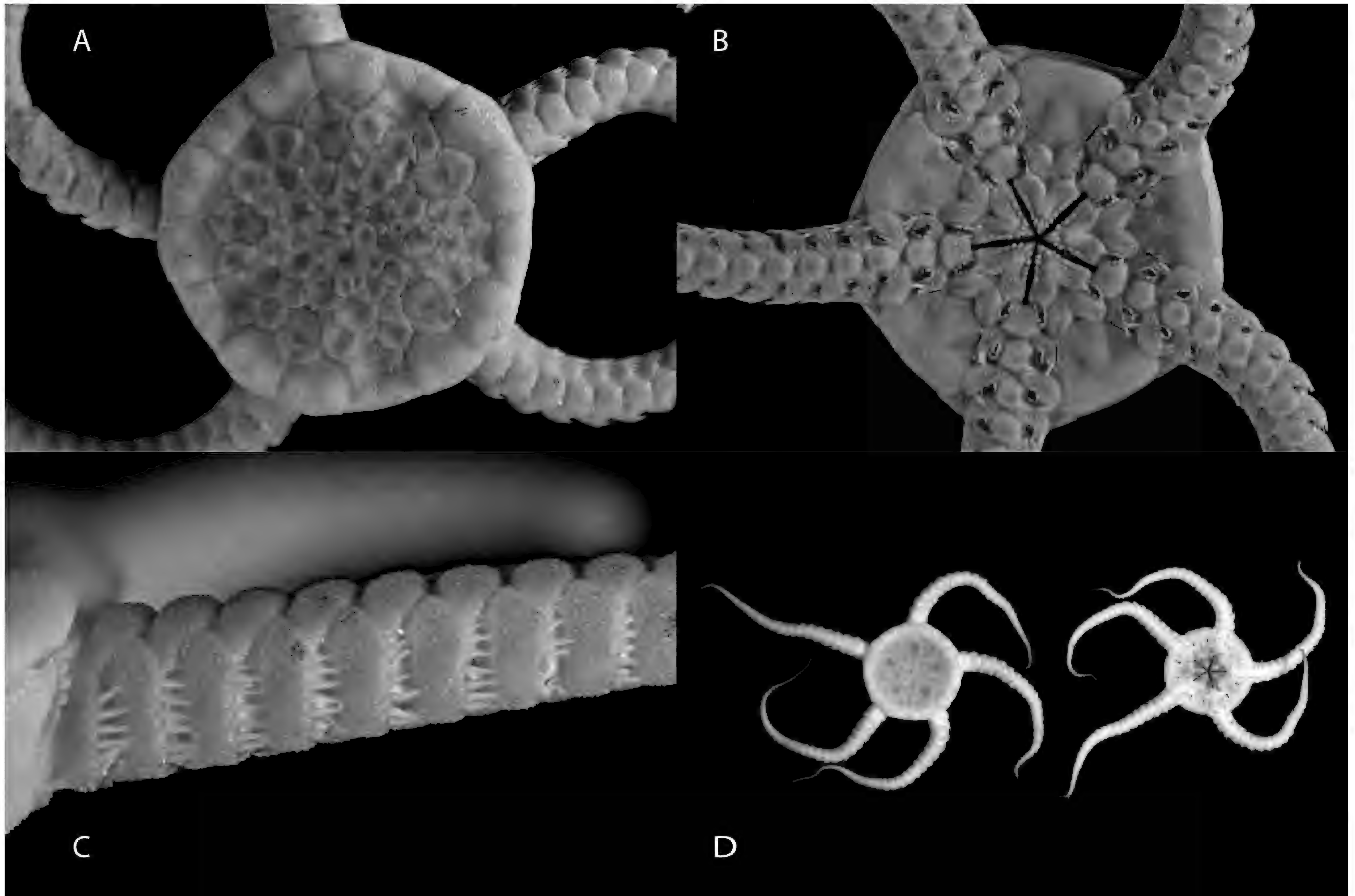


Figure 14. *Amphiophiura insolita*. (A-C) NMV F305623 (Op 5, 14.5 mm dd) dried, (A) dorsal, (B) ventral, (C) arm. (D) NMV F308054 (Op 138, 10 mm dd) live colour.

Description of IOT material Disc to 14.5 mm dd, slightly pentagonal in outline, thick coin-like shape; contiguous radials and large interradial marginal plate form rim to disc; central disc covered in 5 rows of plates, larger plate between the radial shields radially; a wide plate occurs laterally between the interradial dorsal plates and oral shields; arm comb present laterally, papillae rectangular to rounded; oral shield covers almost all the interradial disc surface; adorals contiguous, proximal to oral shield; basal tentacle pores large and open, with up to 8 small scales; arms short, up to 2 x dd; DAPs rounded, slightly convex, contiguous; VAPs rounded to just wider than long, tumid; to 7 sharp sep-

arate arm spines, up to $\frac{1}{2}$ segment in length; live colour orange-white, with darker radial shields, and lighter marginal interradial plates, arms banded orange-white every 6 segments or so.

Taxonomic remarks The IOT specimens have been identified as *A. insolita* on the basis of the long numerous arm spines. *Amphiophiura sordida* from the western Australian continental margin has smaller arm spines. The lower bathyal Indo-Pacific species, *A. paraconcava*, has first lateral arm plate expanded.

Distribution East Indian-West Pacific Oceans (190–1060 m); IOT (527–997 m).

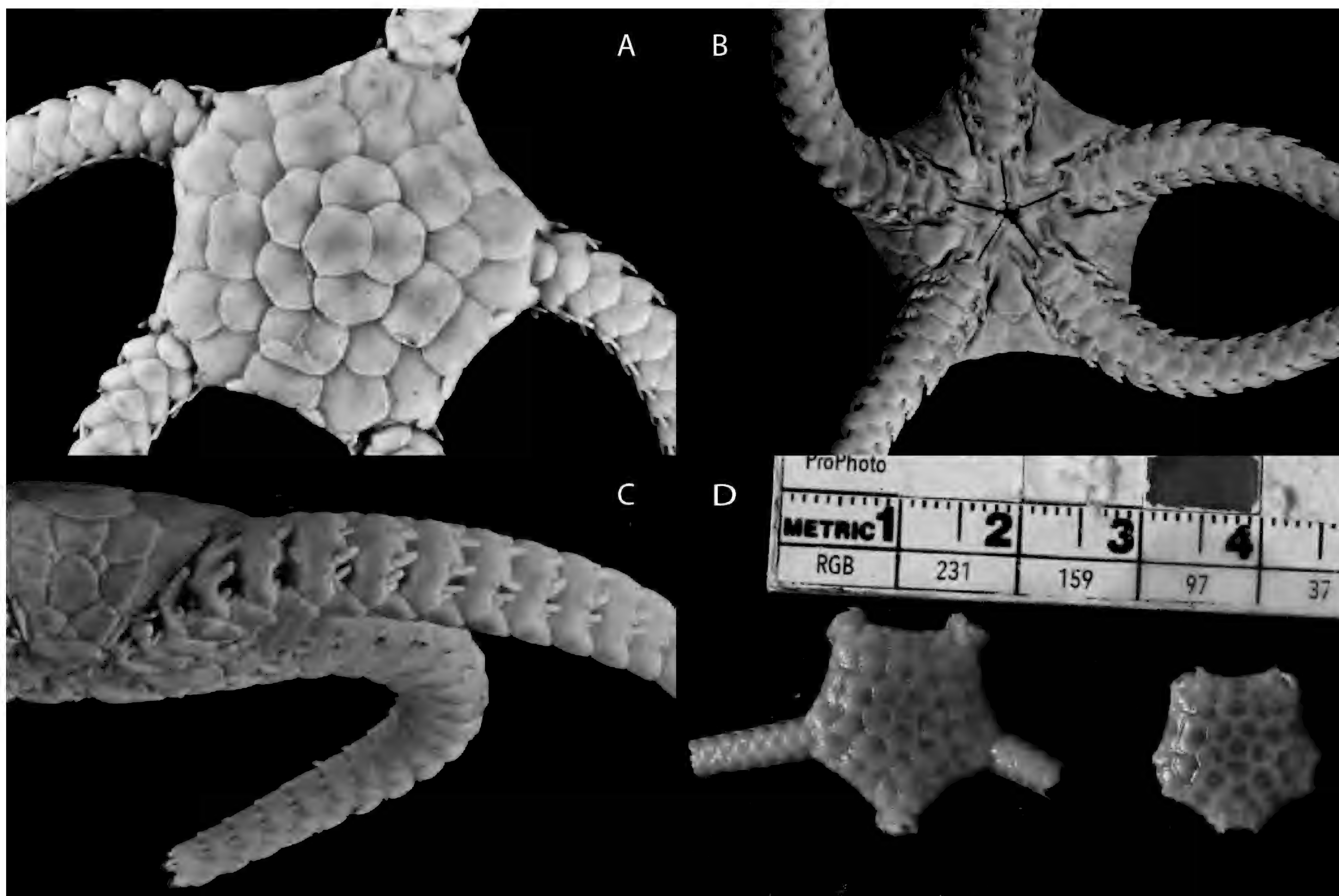
Amphiophiura laudata (Koehler, 1904)

Figure 15. *Amphiophiura laudata*(A-C) NMV F305612 (Op 5, 14 mm dd) dried, (A) dorsal, (B) ventral, (C) arm. (D) NMV F308104 (Op 167, 15 mm dd) live colour.

Description of IOT material Disc pentagonal to 15 mm dd, few flat overlapping disc plates including the primary rosette, secondaries and marginal interradi- al plates; radial shields broadly contiguous, only separated proximally; arm comb papillae small rounded, restricted to lateral sides of arms; few ventral disc plates in 2 rows; trilobed oral shields, longer than wide; 3 peg-

like arm spines, to 1/2 arm segment in length, upper a little separated.

Taxonomic remarks The sympatric *A. confecta* differs in lacking the radial secondary disc plates, having the primary plates directly abut the radial shields.

Distribution Indonesia, SW Pacific, SE Australia (265–1050 m), IOT (527–997 m).

Amphiophiura spatulifera Koehler, 1922

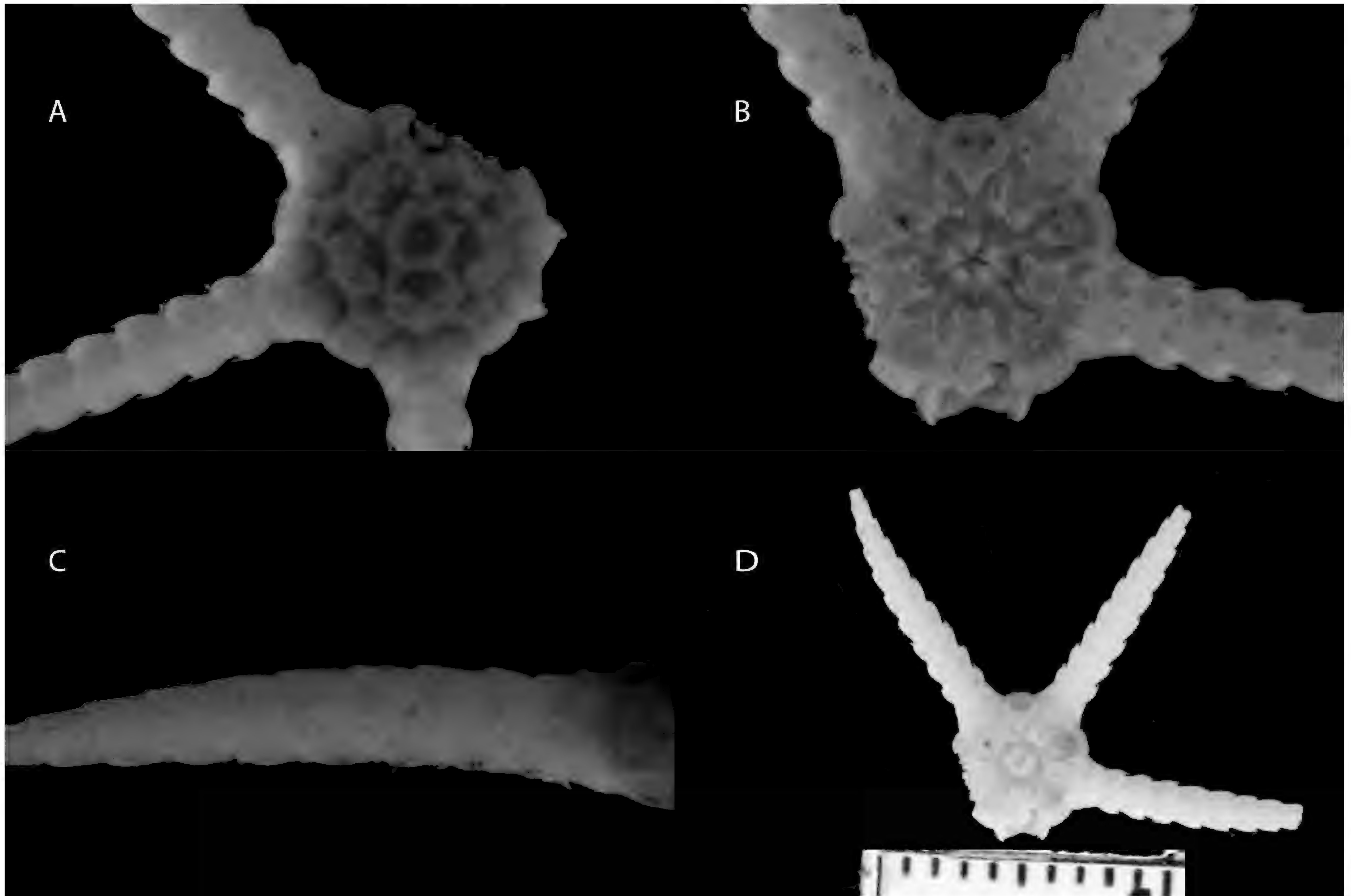


Figure 16. *Amphiophiura spatulifera*. NMV F305565 (Op 9, 4 mm dd) preserved, (A) dorsal, (B) ventral, (C) arm. (D) live colour.

Description of IOT material Disc 4 mm, covered in 6 polygonal primary plates, some small intercalary plates, and interradian series of 2 plates between the contiguous pentagonal radial shields; arm comb papillae spatulate-shaped, rounded and widened apically; large lateral disc plate abuts oral shield; oral shield dominates ventral disc, with squared distal edge and proximal angle; adorals and oral shields sunken compared to oral

shields; arms robust and straight, less than 2 x dd; DAPs fan-shaped, separate after 2nd plate; 3 arm spines to $\frac{1}{4}$ segment in length, well separated.

Taxonomic remarks The short straight arms and spatulate arm comb papillae are diagnostic.

Distribution East Indian-West Pacific Ocean from Taiwan to northern New Zealand; IOT (957–1154 m).

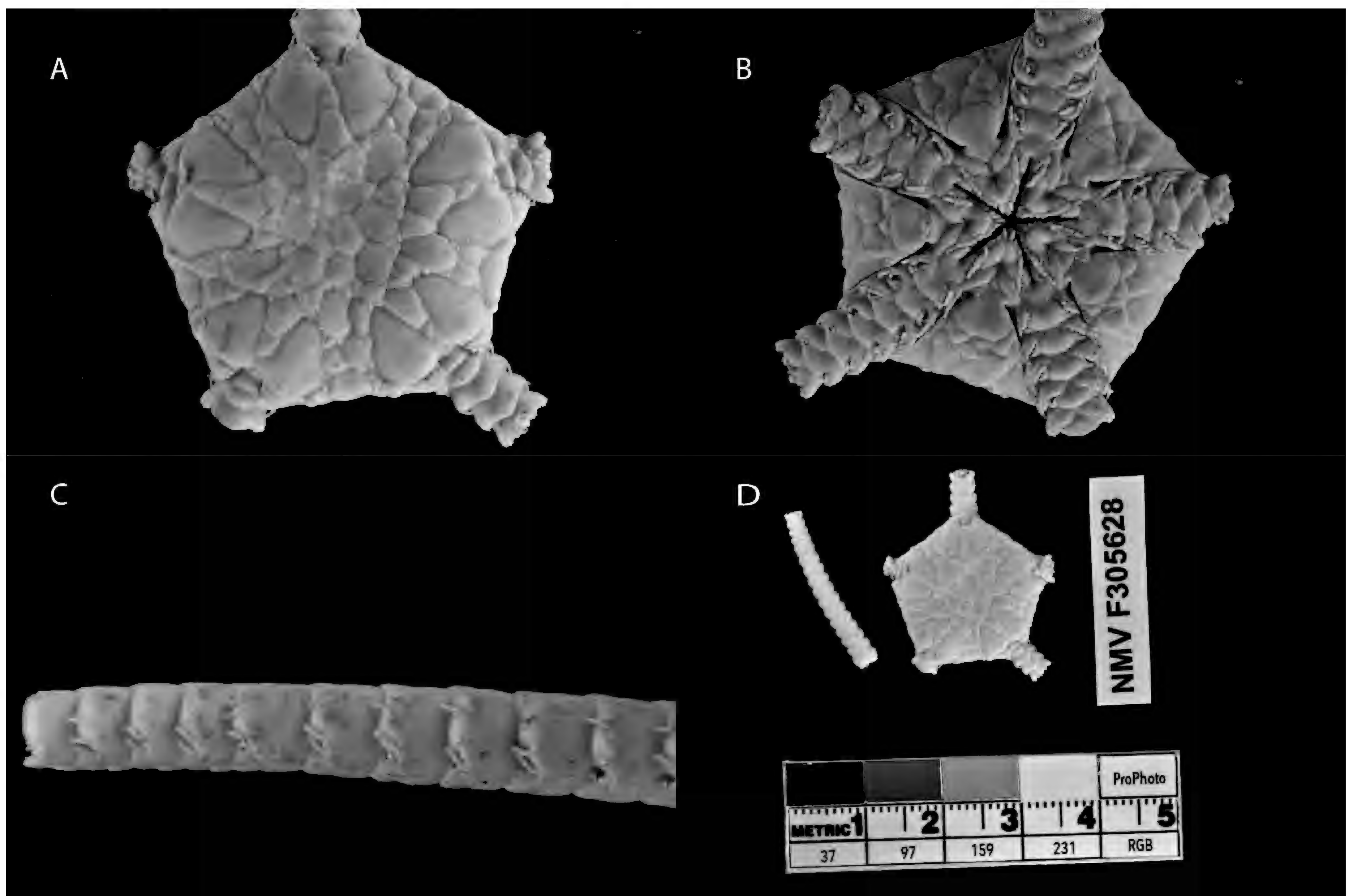
Amphiophiura urbana Koehler, 1904

Figure 17. *Amphiophiura urbana* (A-D) NMV F305628 (Op 18, 18 mm dd) preserved, (A) dorsal, (B) ventral, (C) arm. (D) whole animal.

Description of IOT material Disc pentagonal to 18 mm dd, covered in polygonal plates, with primary and some interr radial plates notably larger; radial shields broadly triangular, contiguous distally, to $\frac{1}{4}$ dd; arm comb papillae conical to spiniform; oral shield incised laterally with rounded distal margin and proximal angle, bordered by 1–3 rows of ventral disc plates; DAPs fan-shaped contiguous; basal VAPs contiguous, no supplementary plates; 3 arm spines to $\frac{1}{4}$ segment in length, lower ones often upturned, dorsal one separated; live

colour white with orange-red outlines around some disc plates and DAPs, radials with orange markings.

Taxonomic remarks Genetic data shows this species is closer to *Ophiuroglypha* than other *Amphiophiura* species (Christodoulou *et al.*, 2019). Its closest relative is an undescribed bathyal species from Southern Australia and New Zealand.

Distribution Indonesia, SW Pacific (240–1114 m), Southern Australia (108–560 m); IOT (427–1114 m).

Anthophiura granulata (H.L. Clark, 1939)

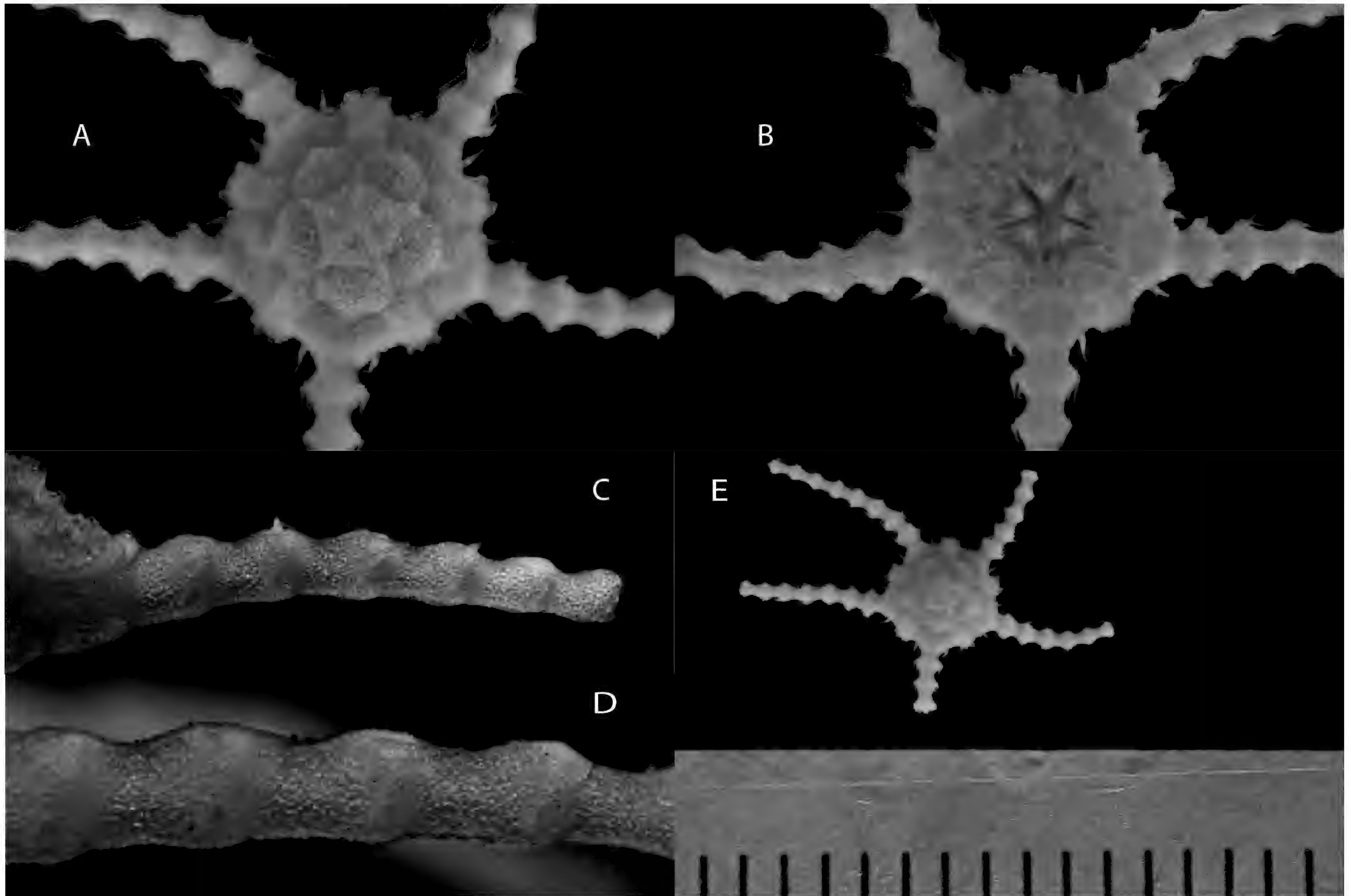


Figure 18. *Anthophiura granulata* (A-D) NMV F305783 (Op 103, 2.5 mm dd) preserved, (A) dorsal, (B) ventral, (C-D) arm, (E) whole animal.

Description of IOT material Disc to 2.5 mm dd, the few disc plates include a pentagonal centrodorsal, a ring of primary plates that are tuberculated, contiguous radial shields and two plates interradially, the outer one with 3 distal tubercles, a single ventral disc plate, no arm comb, a few genital granules between swollen first lateral arm plate and genital plate; one dorsal arm plate just distal to the radial shields; first lateral arm plates (under the disc) are enlarged; 2 ventral arm plates, oral tentacle pore with several tentacle scales thereafter 1-0 scales, 2 arm spines, longest on basal segments, slender,

pointed, to 2/3 segment long.

Taxonomic remarks Various species have been described based on slight differences in disc plating or number of arm spines, but there appears to be much individual variation as well as growth changes. Species boundaries require delimitation. The IOT specimens have been referred to *A. granulata* because of the rough disc plating

Distribution This genus is widespread on bathyal and abyssal seafloors (1000–5370 m). IOT (3510–3839 m).

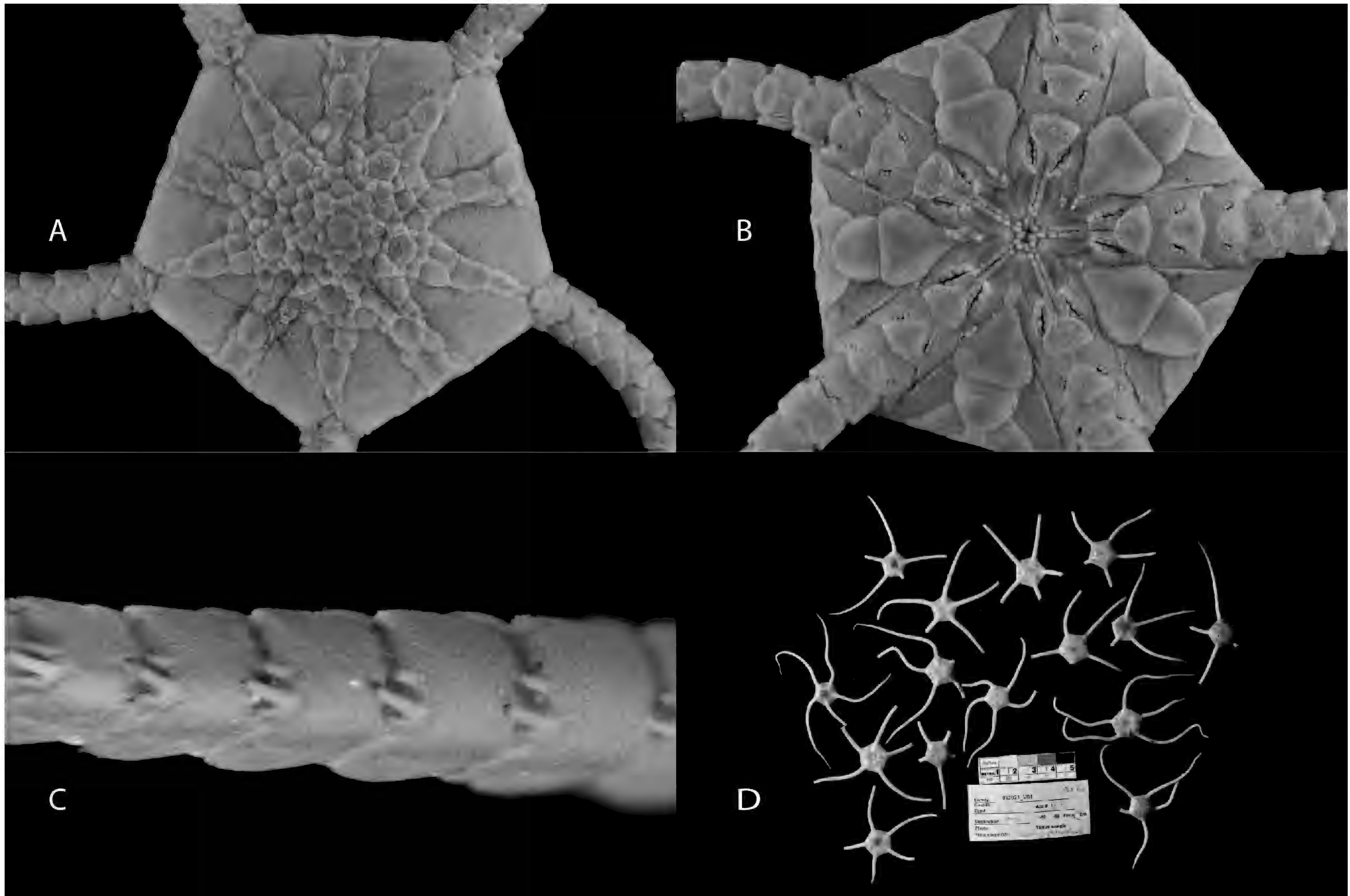
Ophioplinthus sp.MoV.7271

Figure 19. *Ophioplinthus* sp.MoV.7271 (A-C) NMV F305618 (Op 26, 12 mm dd) dried, (A) dorsal, (B) ventral, (C) lateral arm. (D) NMV F 193469 (Op 31) live colour.

Description of IOT material Disc pentagonal to 17 mm dd, radials broadly triangular, $\frac{1}{4}$ dd in length, separate, small rounded scales between, primary plates evident, a large marginal plate on the interradiar margin, no arm comb but a row of small tumid plates distal to the radial shield; the few ventral disc plates include a larger plate that is contiguous with the oral shield, and 2-3 along margin; oral shields large, with convex outer edge and an acute angle proximally, sometimes the proximal tip is fragmented into a separate plate, sometimes the oral shield can be split longitudinally by an invasive hydroid; basal dorsal arm plates polygonal and contiguous becoming separate and kite-shaped to ovoid after the 5-6th free segment; first arm plate large, wider than long, always separate; two arm spines on the ventral half of the lateral arm plates, the lower one

is adjacent to the tentacle pore; 4-5 tentacle scales on both sides of the 2nd oral tentacle pore, with 2-3 on the next segment, then 1-2 on succeeding plates, scales becoming spiniform by the 3-4th segment.

Taxonomic remarks Taxonomy of *Ophioplinthus* species is difficult due the presence of parasitic hydroids and sponges that alter the shape of external plates. DNA evidence indicates that this species is sister to, but distinct from, *O. accomodata* from Southern Australia. Unfortunately, we lack DNA from many of the bathyal Atlantic and Pacific species that would give us evidence to refer the IOT material to a described species.

Distribution IOT (1915–3172 m).

Ecology and life history Lower bathyal soft sediment species. Very numerous on Balthazar seamount at 2300 m.

Ophiopyrgus trispinosus Koehler, 1904

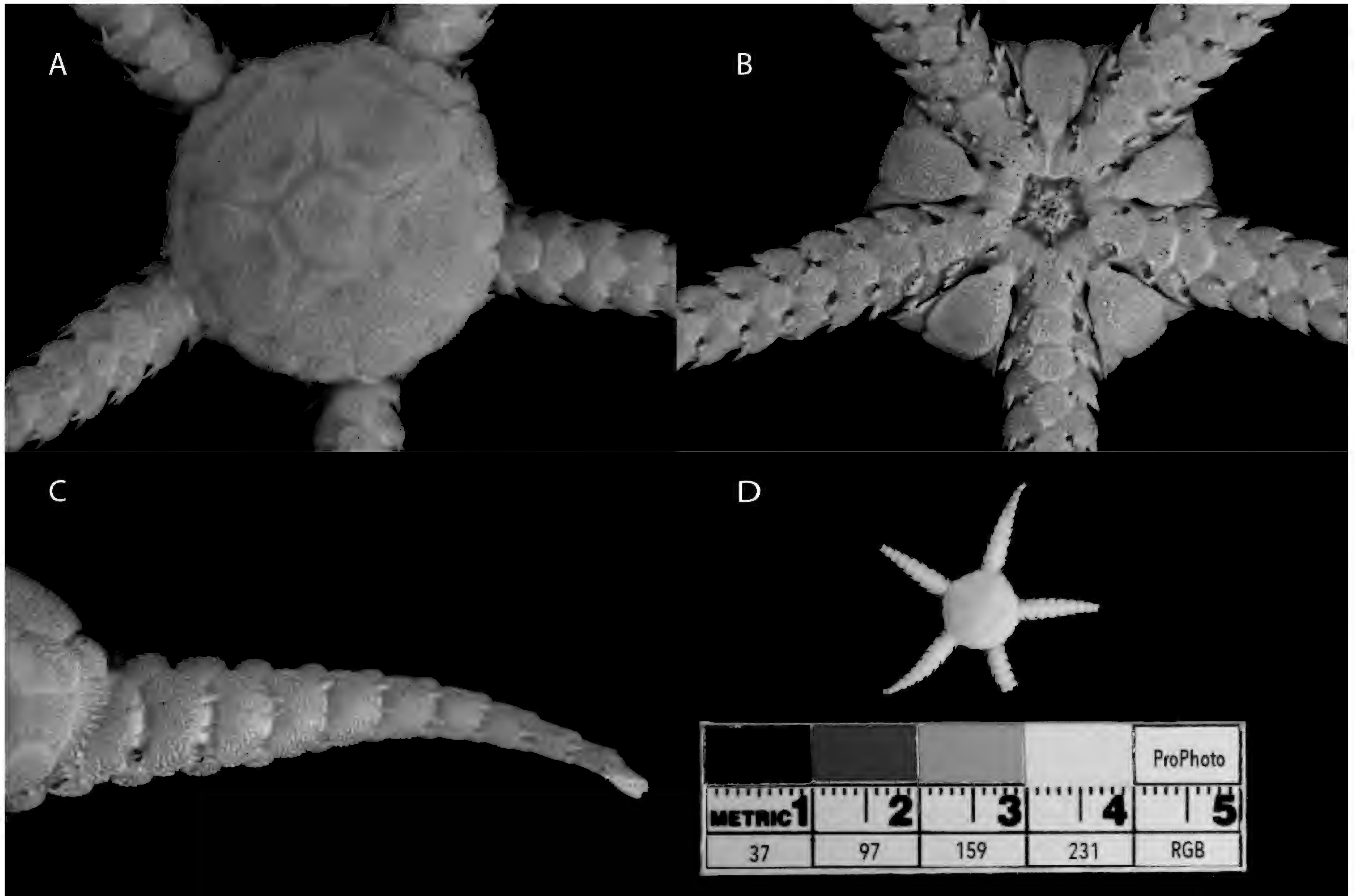


Figure 20. *Ophiopyrgus trispinosus* (A-D) NMV F305625 (Op 5, 7 mm dd) dried, (A) dorsal, (B) ventral, (C) lateral arm. (D) whole body.

Description of IOT material Disc to 7 mm dd, disc dominated by the contiguous primary plates, with the radial shields and interrarial plates forming a thin surrounding rim, genital papillae spiniform, only observable dorsally at the sides of the arms; ventral disc surface dominated by the large oral shield, which is constricted and sunken proximally; adorals long and contiguous, beaded; oral plates and papillae sunken; arms short and tapered, 1.25x dd; DAPs swollen, higher than LAPs, hexagonal and contiguous proximally, but becoming separate and fan-shaped by the 4th plate; VAP1 axe-head to dumbbell shaped, notched laterally for the 2nd oral tentacle pore, longer than wide, VAPs 2-3 contiguous, quadrangular to hexagonal, subsequent plates separate; 3 separate pointed arm-spines, to 0.4x

segment in length, swollen and granular; at arm base 3-4 oval tentacle scales on the LAP, opposing 3 on the VAP, becoming 2 on LAP and one on VAP by 7th segment; colour: white.

Taxonomic remarks This species is paedomorphic (adults with juvenile appearance). It can be distinguished from the superficially similar *Ophiotypa simplex* in having visible radial shields and an arm comb. *Ophiopyrgus saccharatus* from the central Pacific differs in having a single arm spine and more triangular oral shields.

Distribution East Indo-West Pacific, from Christmas Island to Tonga, and Philippines to 35°S (120–2000 m); IOT (643–997 m).

Ecology and life history Soft sediment inhabitant.

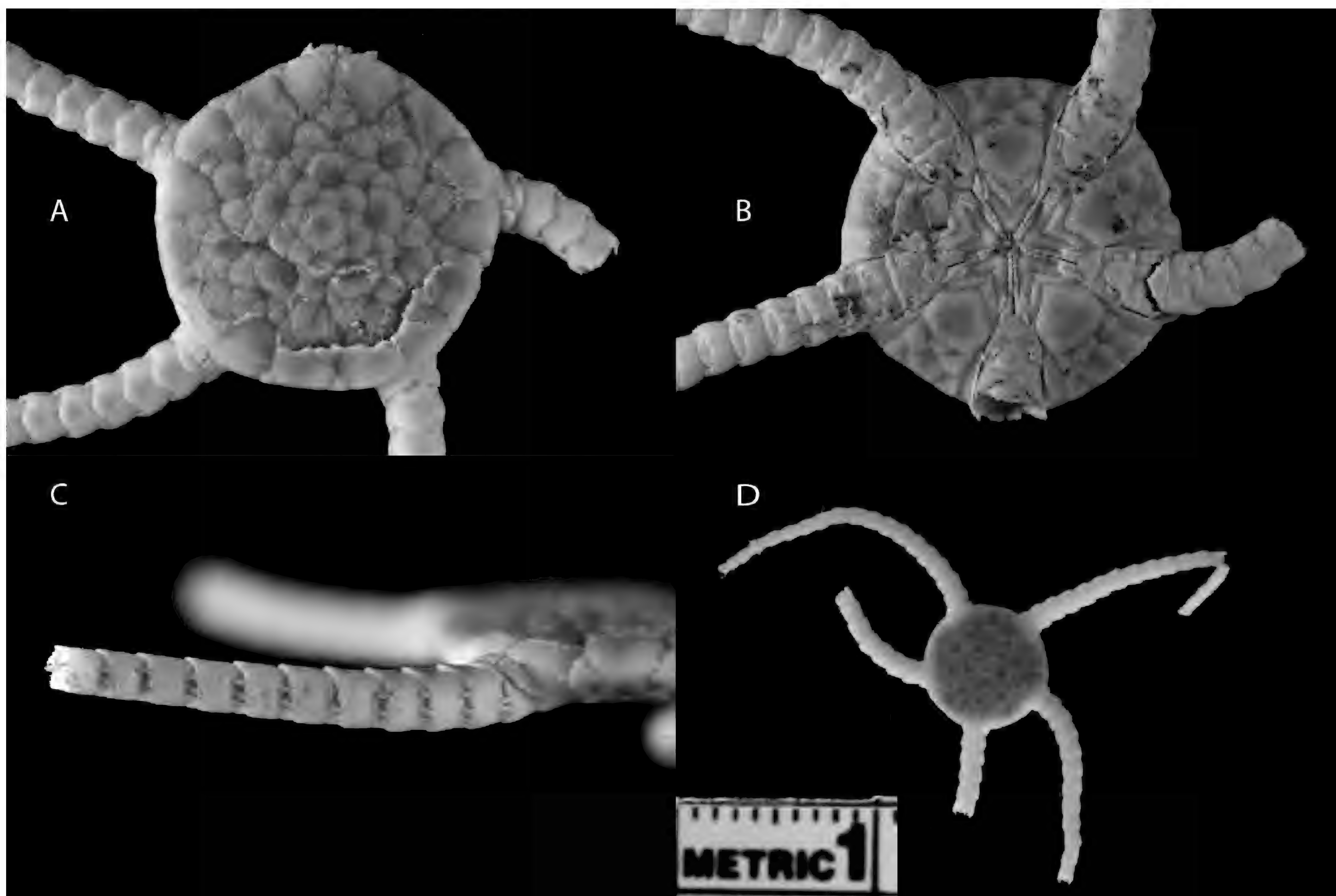
Ophiuroglypha clemens (Koehler, 1904)

Figure 21. *Ophiuroglypha clemens* (A-C) NMV F305627 (Op 9, 8 mm dd) dried, (A) dorsal (disc broken on lower right), (B) ventral, (C) lateral arm. (D) NMV F305567 (Op 9, 8 mm dd) whole body.

Description of IOT material Disc to 8 mm dd, scales flat and imbricating, primaries evident; radial shields contiguous for distal half their length; arm comb composed of flat elongated papillae that continue across the dorsal arm; genital papillae small, continue to oral shield; DAPs fan-shaped, separate; first and second VAPs only narrowly contiguous, basal VAPs with supplementary plates on either side; VAPs becoming much

wider than long; 3 cylindrical arm spines, $\frac{1}{4}$ the segment in length, middle one becoming hook-shaped distally; numerous tentacle scales basally.

Taxonomic remarks A similar species, *O. jejuna*, described from Tristan da Cunha in the southern Atlantic, has longer arm spines (to $\frac{2}{3}$ segment).

Distribution Philippines to southern Australia (326–2518 m); IOT (957–1533 m).

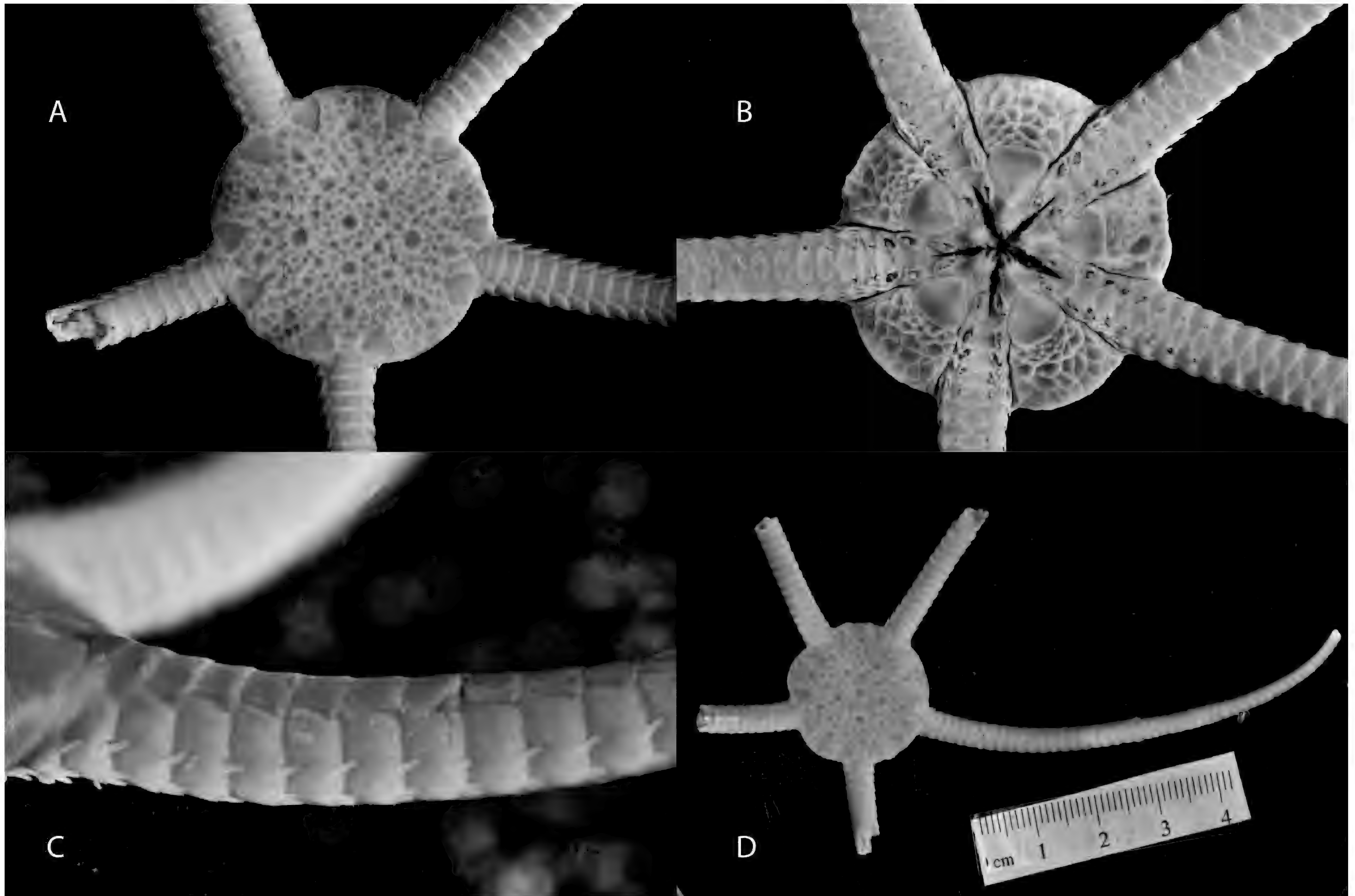
Ophiuroglypha cf. *irrorata* (Lyman, 1878)


Figure 22. *Ophiuroglypha* cf. *irrorata*(A-C) NMV F308069 (Op 9, 23 mm dd), (A) dorsal, (B) ventral, (C) lateral arm. (D) whole body.

Description of IOT material Disc to 23 mm dd with sharp compressed margin, covered in overlapping plates, primaries prominent; radial shields as wide as long, rounded, separate; arm comb papillae spatulate, separate; genital papillae small, restricted to genital slit near disc margin; DAPs trapezoid, twice as wide as long basally, contiguous; first and second VAPs fully contiguous, supplementary VAPs present at the lateral edges of basal arm segments, becoming separate and rectangular after the third segment; oral and basal arm tentacle pores with numerous small scales; 3 arm spines to 1/3 segment long, the upper one a little separated from the other 2, middle one becoming hook-shaped distally.

Taxonomic remarks The *Ophiuroglypha irrorata*-complex has been considered a polymorphic taxon with numerous regional synonyms or subspecies (Paterson, 1985). However, DNA evidence suggests it is better considered a recent radiation of numerous species (Christodoulou *et al.*, 2019), that differ in the presence of the supplemen-

tary ventral arm plate on basal arm segments, number of arm spines, form and position of the arm comb-genital papillae, shape of the disc margin, and the size of the dorsal arm plates. More taxonomic research is required to link morphological variation with old available names. There are no DNA sequences available for lower bathyal specimens of South Africa, the type locality of *O. irrorata*, so it is unclear which genetic clade represents this species name. Paterson (1985) separated *O. irrorata* from *O. concreta* on the basis that the upper arm spine is not widely separated from the two lower spines, but this is a variable condition, even on a single individual. The IOT specimens are unlikely to be *O. irrorata sensu stricto* as the holotype has genital papillae that continue along the genital plate until the oral shield and radial shields that are longer than wide.

Distribution The *Ophiuroglypha irrorata*-complex has been reported from upper-bathyal to abyssal depths from all of the world's oceans, however, this is likely to be a species-complex. IOT records (2289–3100 m).

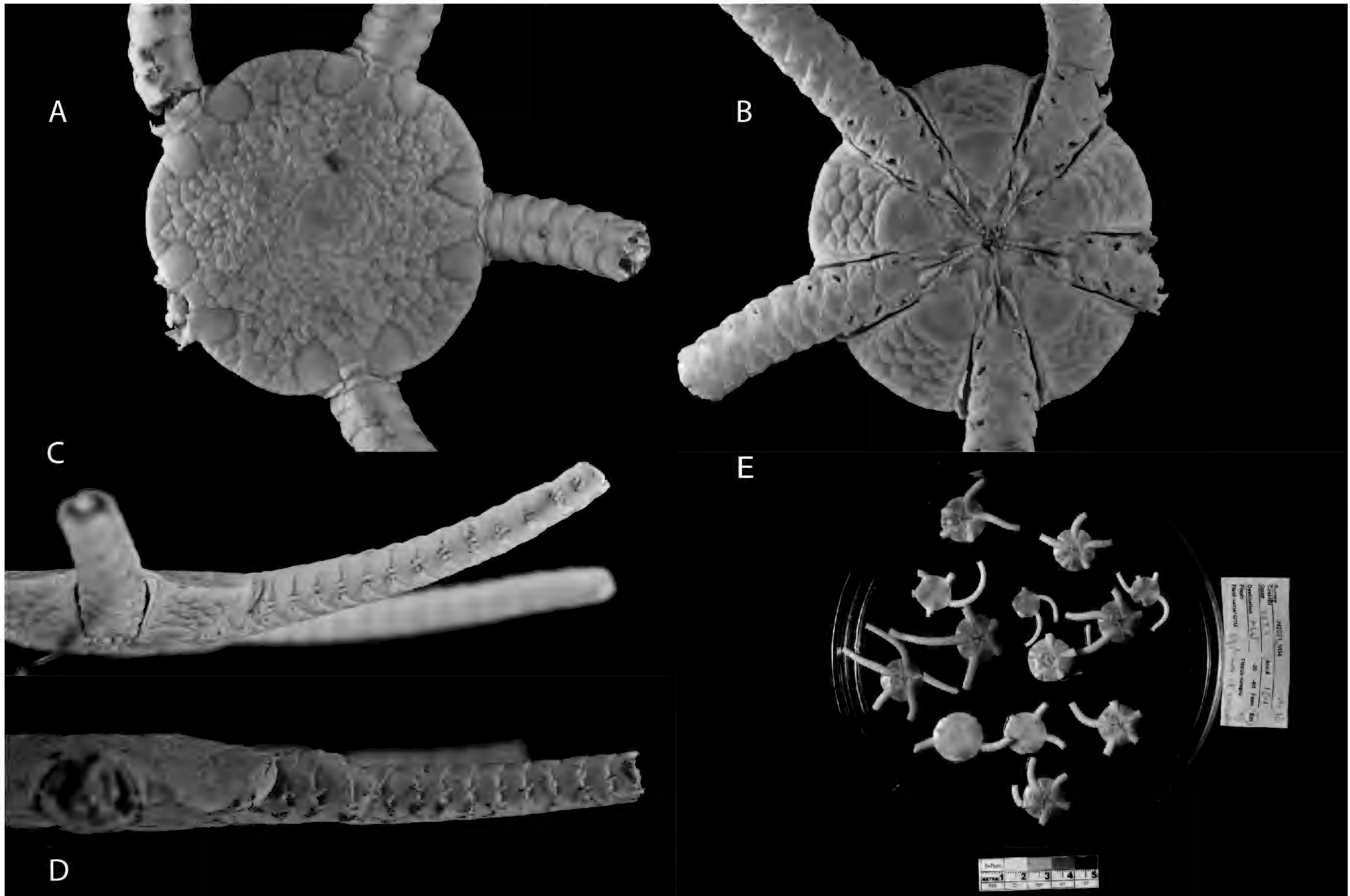
Ophiuroglypha orbiculata (Lyman, 1878)

Figure 23. *Ophiuroglypha orbiculata* (A-C) NMV F305630 (Op 31, 16.5 mm dd) dried, (A) dorsal, (B) ventral, (C) 'orbiculata' lateral arm with 3 arm spines close together; (D) NMV F305631 (Op 33, 21.5 mm dd) 'involuta' lateral arm with separate upper arm spine; (E) NMV F305539 (Op 31, 20 mm dd) live colour.

Description of IOT material Disc to 23 mm dd rounded, margin thin, covered in imbricating scales, centrodorsal prominent; radial shields slightly longer than wide, rounded, separate; scale-like contiguous arm comb papillae continuing as low rectangular genital papillae on most specimens; oral shield pentagonal; DAPs trapezoid but rapidly become less than half the arm segment in width; first VAP widely contiguous with second, supplementary VAPs present on basal segments, VAPs progressively becoming wider and more separated down arm; 3 arm spines, upper can be a separated from the other 2.

Taxonomic remarks Differs from *O. cf. irrorata* in having scale-like close-set arm comb papillae. There is

some polymorphism amongst these specimens. Those with 3 arm spines close together ('orbiculata') and those that have the upper spine separated ('involuta'). There are also differences in the extent of the genital papillae, with some specimens having wide rectangular papillae that continue to the oral shield and others with smaller papillae that finish half-way along the slit. The DAPs are generally as long as wide but can be widened at the base on some specimens. DNA data from more specimens is required to ascertain if one or more species are present.

Distribution Off Japan and India (3196–3487 m); IOT (1175–3100 m).

Ophiuroglypha sp.MoV.7273

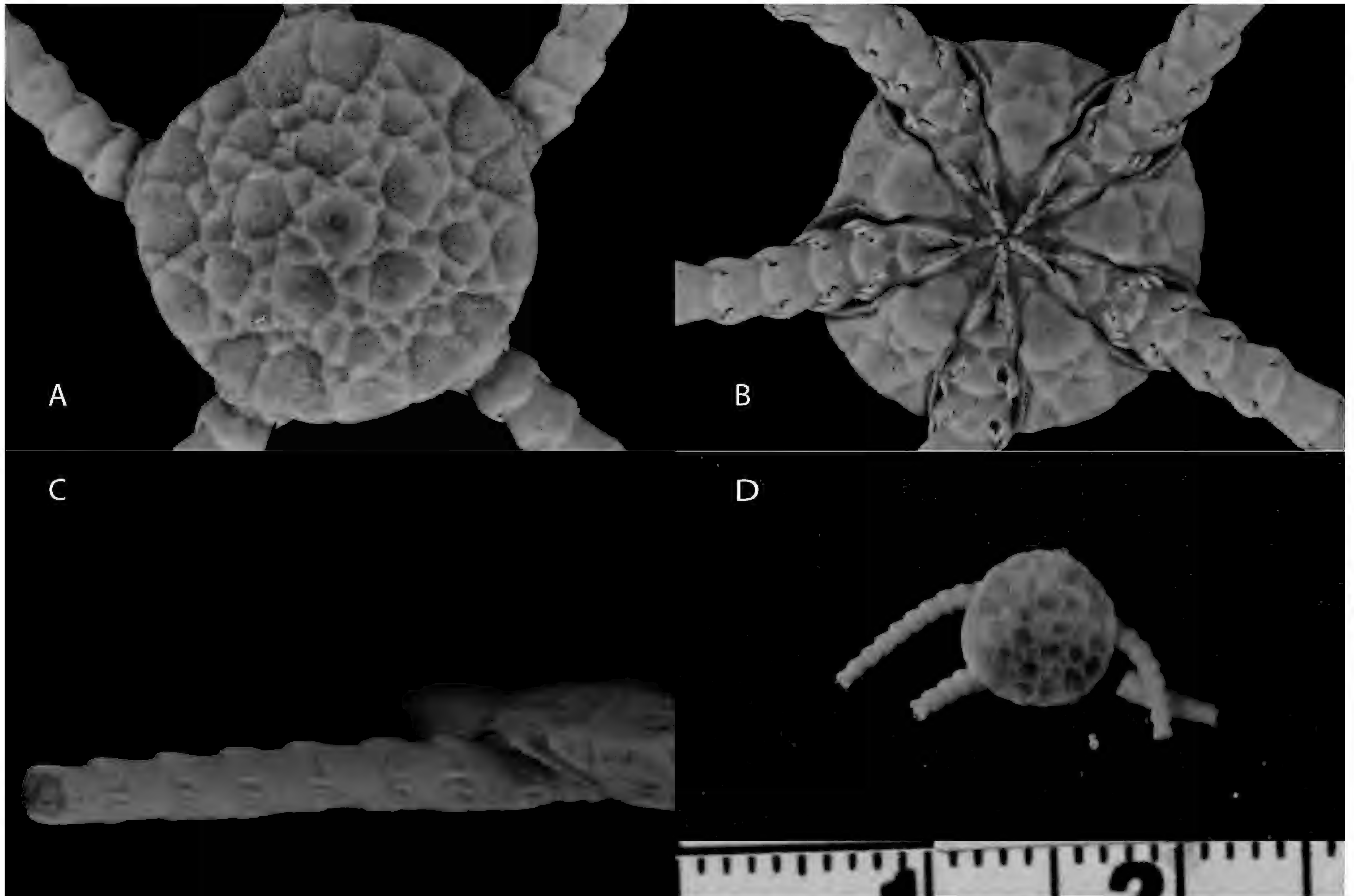


Figure 24. *Ophiuroglypha* sp.MoV.7273 (A-C) NMV F305629 (Op 46, 6 mm dd) dried, (A) dorsal, (B) ventral, (C) lateral arm. (D) NMV F305546 (Op 35, 5 mm dd) whole body.

Description of IOT material Disc to 6 mm dd, covered in imbricating plates, among which the primary, secondary rosette and interrarial marginal plates are larger but separated by smaller plates; radial shields contiguous; 6 ventral disc plates in 2 rows, middle marginal plate largest; arm comb consisting of small square papillae continuing across the dorsal arm, continue ventrally as smaller genital papillae for $\frac{1}{2}$ genital slit; trilobed oral shield; first VAP smaller than second

one, all VAPs separate, no supplementary VAPs; 3 peg-like arm spines, to $\frac{1}{3}$ segment in length.

Taxonomic remarks *O. imbecillus* from Japan differs in having spiniform arm comb papillae and a larger first than second VAP. *O. schmidtotti* from off South Africa has the continuous arm comb but differs in having more dorsal disc plates and a pentagonal oral shield.

Distribution IOT (1237–1663 m).

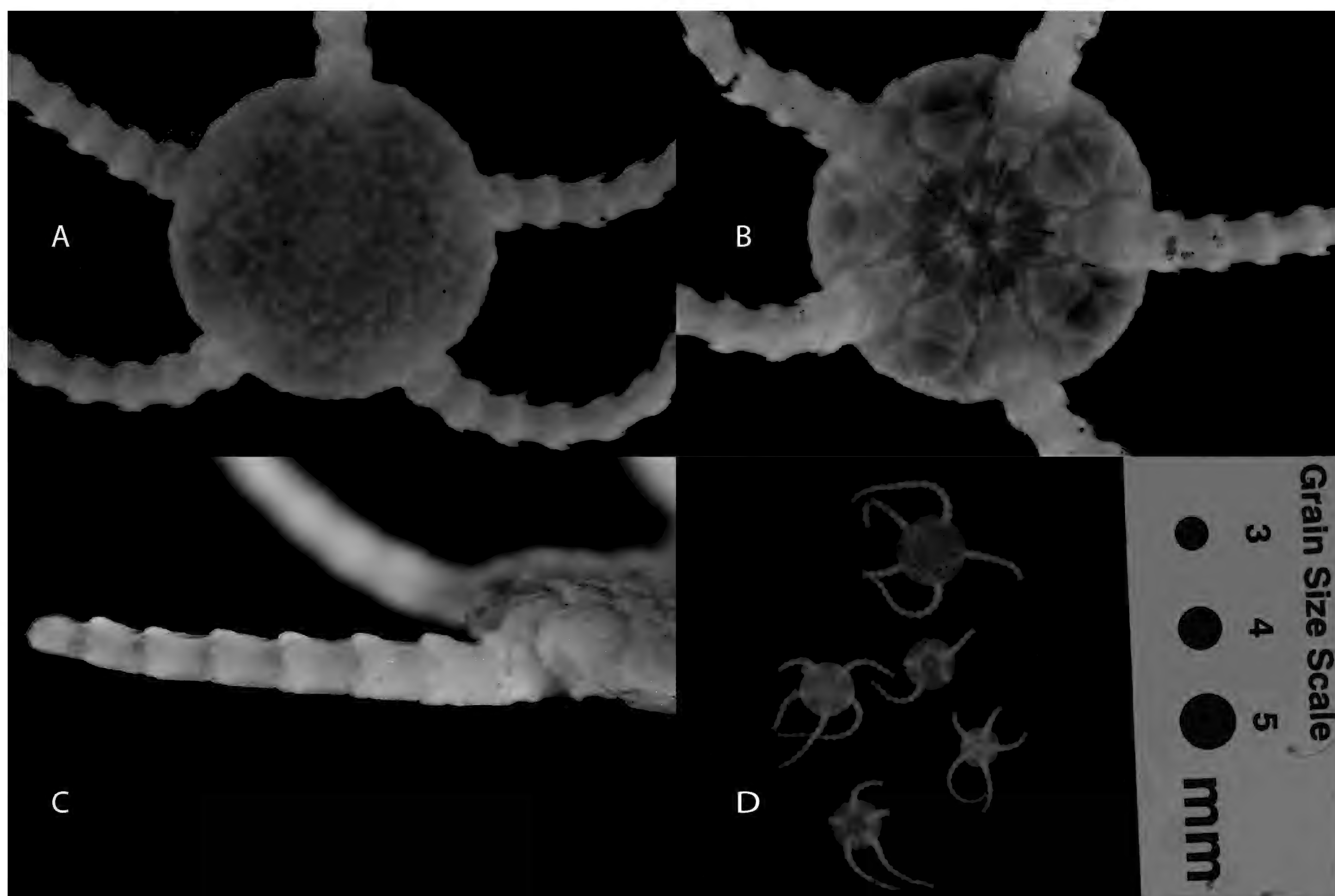
Ophiuroglypha sp.MoV.7344

Figure 25. *Ophiuroglypha* sp.MoV.7344 (A-C) NMV F305600 (Op 28, 4 mm dd) dried, (A) dorsal, (B) ventral, (C) lateral arm. (D) NMV F308073 (Op 145) live colour.

Description of IOT material Disc rounded, to 6 mm dd, covered in polygonal plates, centre of larger plates often sunken, primaries evident; radial shields small, hemispherical, 1/10th dd, contiguous radially; short arm comb of thick rounded papillae lying underneath the disc; oral shields pentagonal with a convex to straight distal edge, straight lateral sides and an obtuse proximal angle; 3 ventral disc plates, a large one adjoining the oral shield and two separate ones on margin; wide separate ventral arm plates, the lateral projections can be separated into supplementary plates basally, small fan-shaped separate dorsal arm plates; 2-3 tiny arm spines, 1/5th segment long, upper one a little separate from others, middle one hooked; 3 scales on each side

of oral tentacle pores, 2-3 on first arm segment, 1-2 on segments 2 and 3, thereafter none.

Taxonomic remarks *Ophiuroglypha glypta* (Clark, 1939) from off India (2727 m) and Eastern Australia (IN2017_V03) differs in having rows of smaller ventral disc plates. *Ophiuroglypha lenta* (Koehler, 1904) from Indonesia (unknown depth) differs in having a wider than long first ventral arm plate that is narrowly contiguous with the second plate. Martynov & Litvinova (2008) assigned *O. glypta* to *Ophioplinthus* with uncertainty. DNA data (unpublished) indicates *O. cf. glypta* is better placed in *Ophiuroglypha*, close to *Anophiura*.

Distribution IOT (2617–3144 m).

Stegophiura sp.MoV.7272

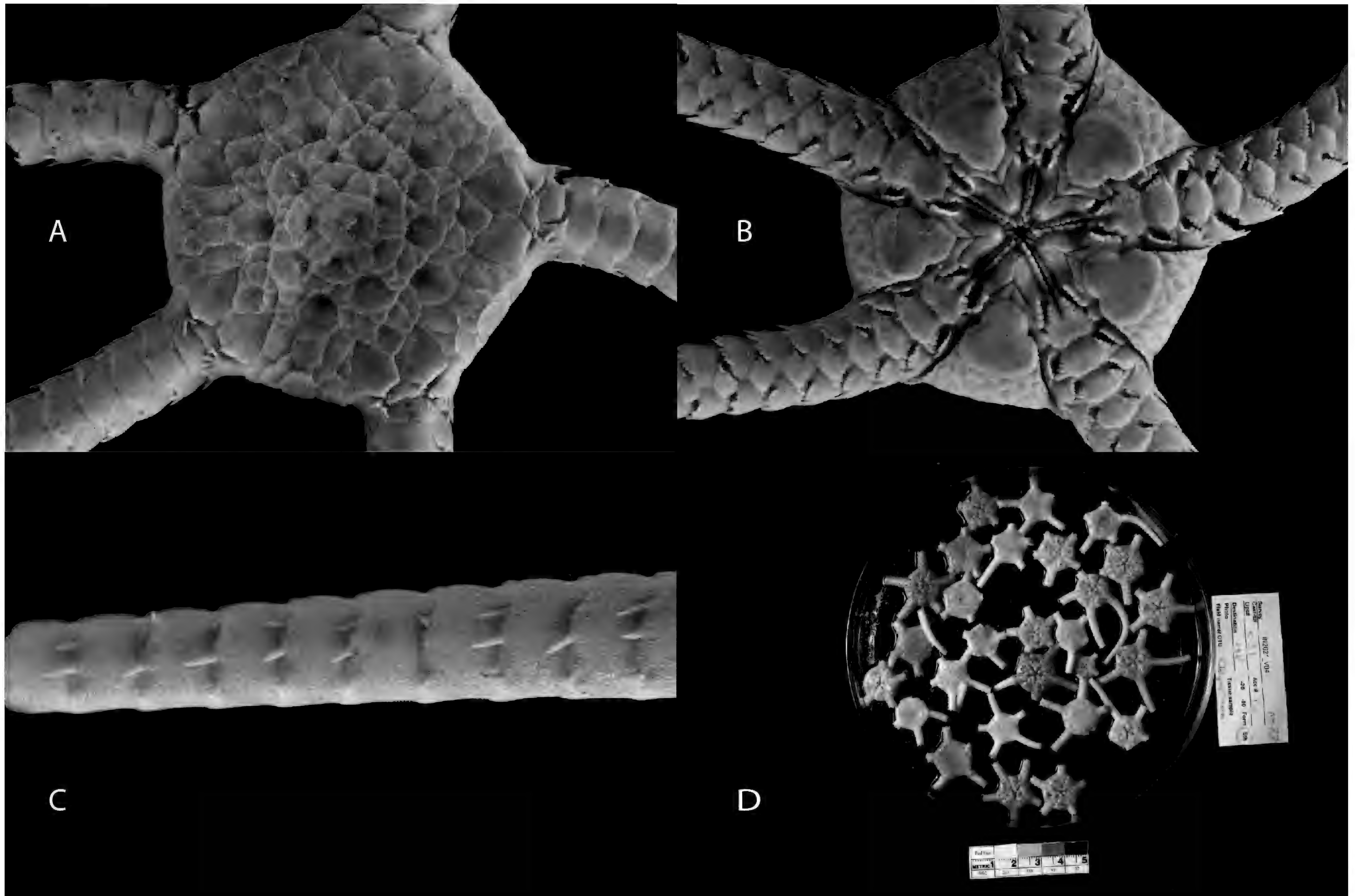


Figure 26. *Stegophiura* sp.MoV.7272 (A-C) NMV F305618 (Op 26, 12 mm dd) dried, (A) dorsal, (B) ventral, (C) lateral arm. (D) NMV F 193469 (Op 31) live colour.

Description of IOT material Disc to 15 mm dd, disc round and thick covered in overlapping disc scales, radial shields hexagonal, contiguous, genital papillae small and triangular becoming spiniform and prominent as the arm comb, a secondary comb of small scale like papillae occur along the distal edge of the first free lateral and dorsal arm plates, oral shields trefoil, occupying half the ventral disc space; typically 3 pointed arm spines (sometimes the lowest one is doubled), up to 5 tentacle scales on both sides of the basal arm pores.

Taxonomic remarks This species appears to differ from described species of *Stegophiura* in lacking the smaller scale-like supplementary arm spines between the longer

ones, have flat rather than thickened basal ventral arm plates, and arms that reach 3 times the disc diameter in length. The supplementary arm spines on other species can be lost through rough handling on collection, however, a search through all the IOT specimens did not reveal a single one. It is noteworthy that the opposing arm comb papillae on the first free lateral and dorsal arm plates are very similar to the scale-like supplementary arm spines on other species.

Distribution IOT (1023–2435 m).

Ecology and life history Appears to live in soft-sediment on the summits and flanks of seamounts.

Family Ophiosphalmidae

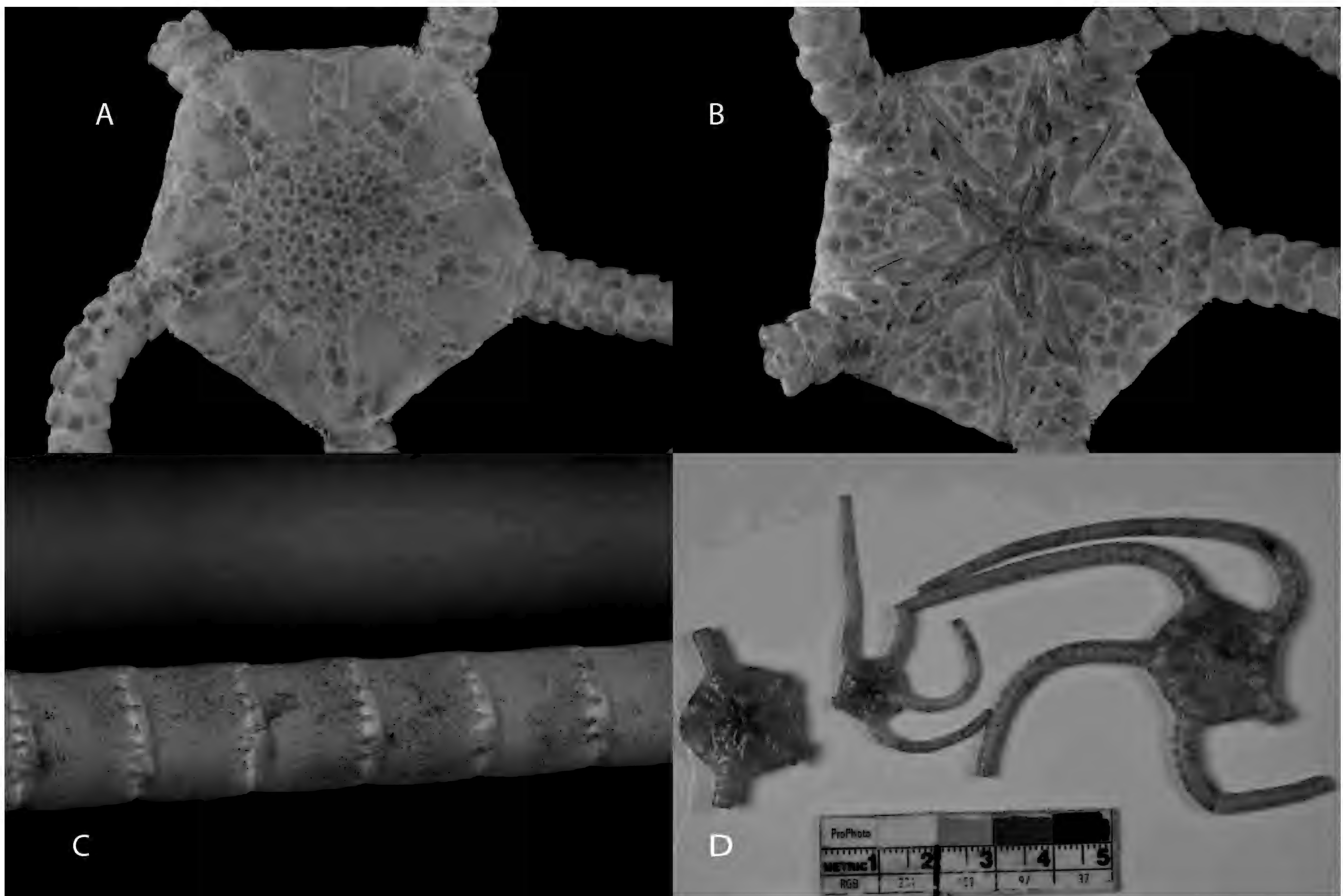
Ophiosphalma fimbriatum (Koehler, 1922)

Figure 27. *Ophiosphalma fimbriatum* (A-C) NMV F305632 (Op 28) dried, (A) dorsal, (B) ventral, (C) lateral arm. (D) NMV F305632 (Op 28) live colour.

Description of IOT material Radial shields large, 2.5x longer than wide, $\frac{1}{4}$ dd, disc otherwise covered in small plates. Cluster of small spines next to the arm base near the disc margin, but do not continue interradially. Genital slit slightly longer than one segment, bordered by small rectangular papillae. Both ventral and dorsal disc plates continue for the length of the arm, becoming separate away from the base. 3 pairs of elliptical tentacle pores at arm base, partially covered by small scales. 7-10 short slender arm spines. Colour off-white, brownish near disc ventrally.

Taxonomic remarks This species is sister to the Atlantic-Southern Ocean species *O. armigerum* on genetic trees

(Christodoulou *et al.*, 2019), which differs in having fewer arm spines (typically 4-5, middle arm spine longest, with the lowest 3 in a cluster). Most specimens of the abyssal Pacific species *O. glabrum* can be distinguished by the presence of spines along the inter-radial disc margin, the 3-5 pairs of observable tentacle pores, and the thinner disc margin.

Distribution Indo-West Pacific mid-lower bathyal species (the few abyssal records may be *O. glabrum* and need re-examination), west and north Indian Ocean (2950–4020 m), Philippines (type, 2011 m), Japan (2170–4330 m), South-west Pacific (1475–2860 m), IOT (1913–2973 m, one specimen from 3948–4047m).

Ophiosphalma laqueatum (Lyman, 1878)

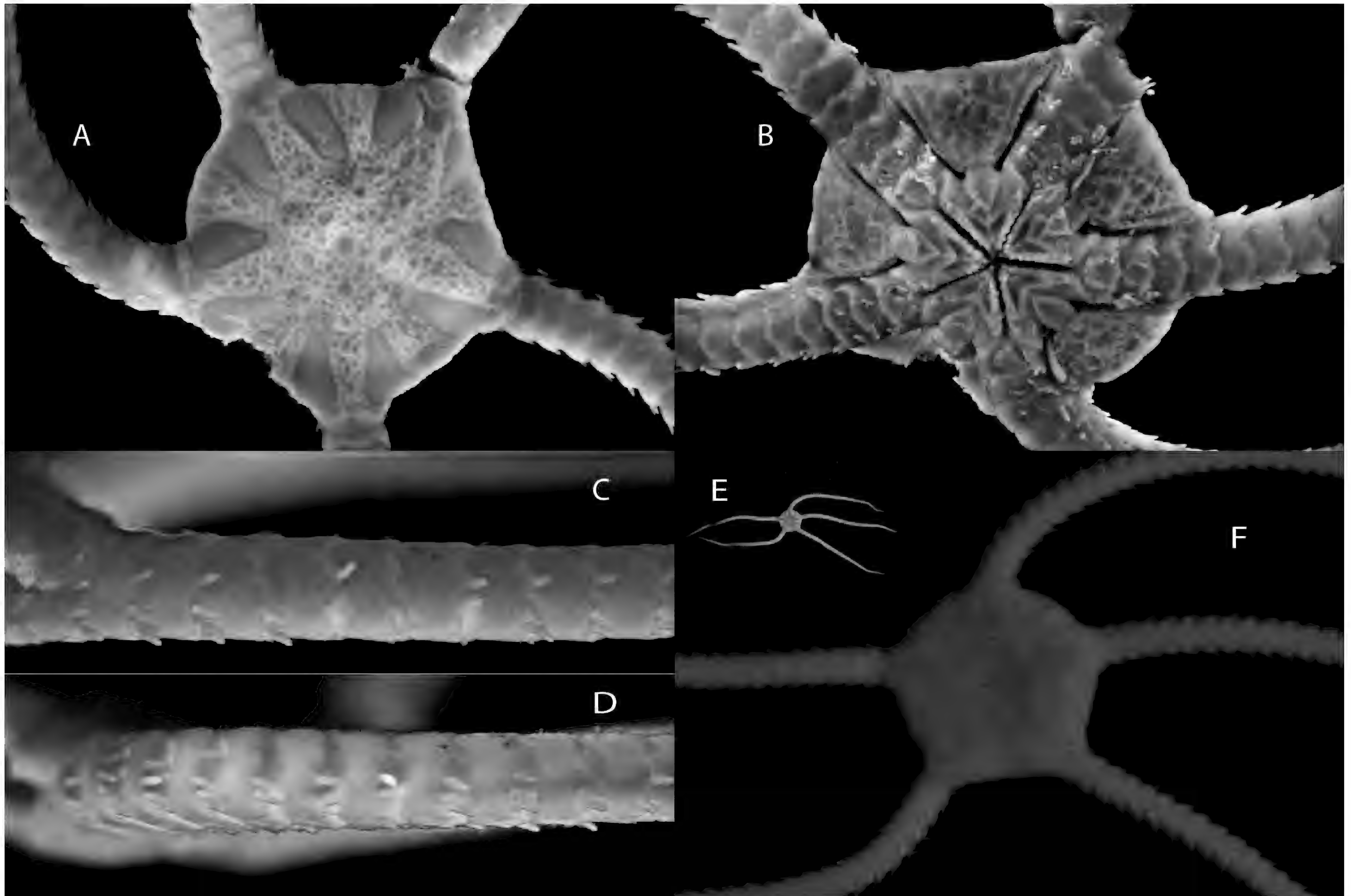


Figure 28. *Ophiosphalma laqueatum*. *Ophiosphalma laqueatum* NMV F307653 (Op 170, 12 mm dd) (A-D) preserved, (A) dorsal, (B) ventral, (C) proximal arm, (D) middle arm, (E-F) live colour.

Description of IOT material Disc to 13 mm dd covered in small scales, the primaries and mid-radial/mid-interradial series a little larger than others; large lustrous radial shields, 1/4x dd, 2.5x longer than wide; genital plate bordered along the slit by a series of square contiguous papillae that become elongated near the disc margin, no marginal spines; basal DAPs contiguous, broadly triangular with a rounded peak on the distal edge; 4 arm spines basally, 2nd lowest longest, to 1/3 segment in length, often erect, upper smaller and separate, can be 5 arm spines in the middle of the arm; tentacle pores decrease in size from 2nd to 4th VAP

with 2 rounded equal-sized tentacle scales, subsequent VAPs fan-shaped and separate; live colour orange-red, with pale radial shields, larger disc plates and ventral surface.

Taxonomic remarks The arm spines are longer in the IOT specimens than on the types (1/4x segment in length). DNA evidence is required to determine if a separate species occurs in the IOT.

Distribution Tropical East Indo-West Pacific, from the IOT to Fiji and north to southern Japan (76–656 m); IOT (271–311 m).

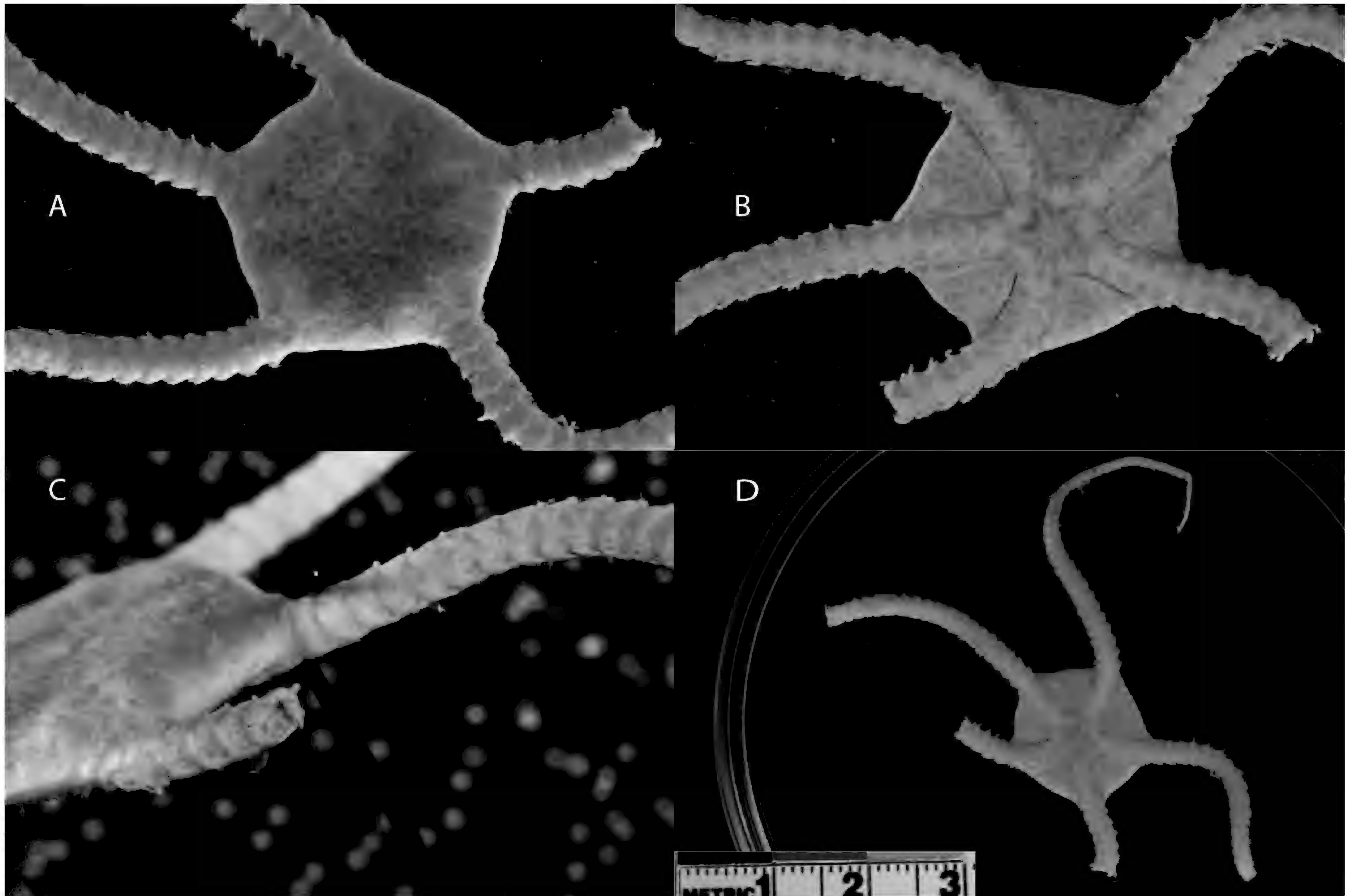
Ophiosphalma sp.MoV.7325

Figure 29. *Ophiosphalma* sp.MoV.7325 (A-D) NMV F305578 (Op 18, 14 mm dd) dried, (A) dorsal, (B) ventral, (C) lateral arm. (D) whole body.

Description of IOT material Disc pentagonal to 14 mm dd, covered in numerous glassy scales embedded in thin skin, primaries not much larger than other scales, larger scale near interradian margin; radial shields 1/6x dd, separated radially by 3 rows of scales; genital slits 4/5 ventral disc, no granules, no spines on folded skin near arm base at margin; oral shield 2x long as wide, pentagonal to spear-head shaped; inner oral papillae triangular, outer 2 flat and widened; free arms 3x dd; first 2 DAPs wider than long and contiguous, becoming kite-shaped and separate, distally triangular; VAPs 2-4

with small rounded tentacle pores, partially covered by a single rounded scale, VAPs small, widely separated, triangular after initial 4; 3 arm spines, lowest thickest and longest, to $\frac{1}{2}$ segment in length, sometimes bilobed at tip, other two arm spines cylindrical to $\frac{1}{3}$ segment in length, upper becomes erect, upper two are hook-shaped distally.

Taxonomic remarks The enlarged ventral arm spine, frequently bilobed at the tip, appears unique within the genus.

Distribution IOT (365–1114 m).

Perlophiura profundissima Belyaev & Litvinova, 1972

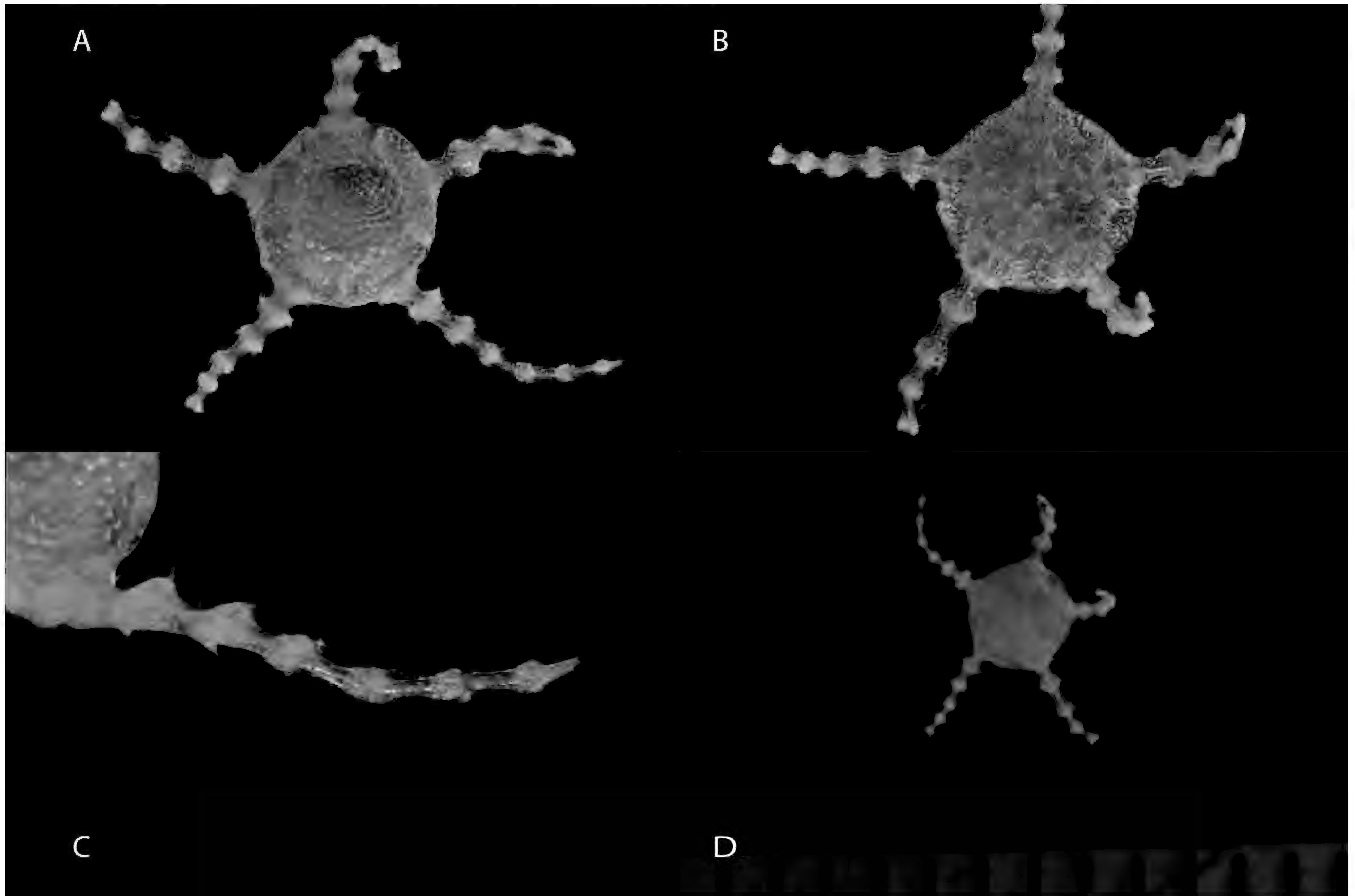


Figure 30. *Perlophiura profundissima* (A-D) NMV F308033 (Op 122, 2 mm dd) dried, (A) dorsal, (B) ventral, (C) lateral arm. (D) whole body with mm scalebar.

Description of IOT material Disc to 2 mm dd; plates include a large pentagonal centrodorsal and 5 wide radial plates, fenestrated; arms very slender; tiny, noded; separate DAPs; VAPs rapidly attenuate in size, widely separate; 2-3 tiny arm spines; 3-4 pairs of open tentacle pores along each arm.

Taxonomic remarks An Ophiosphalmidae with neote-

nous characters. Only one species described.

Distribution Atlantic, Indian and Pacific Oceans, worldwide except for polar regions (1600–8135 m), IOT (4908–4990 m).

Ecology and life history One of the deepest-dwelling ophiuroids.

Family Ophiuridae

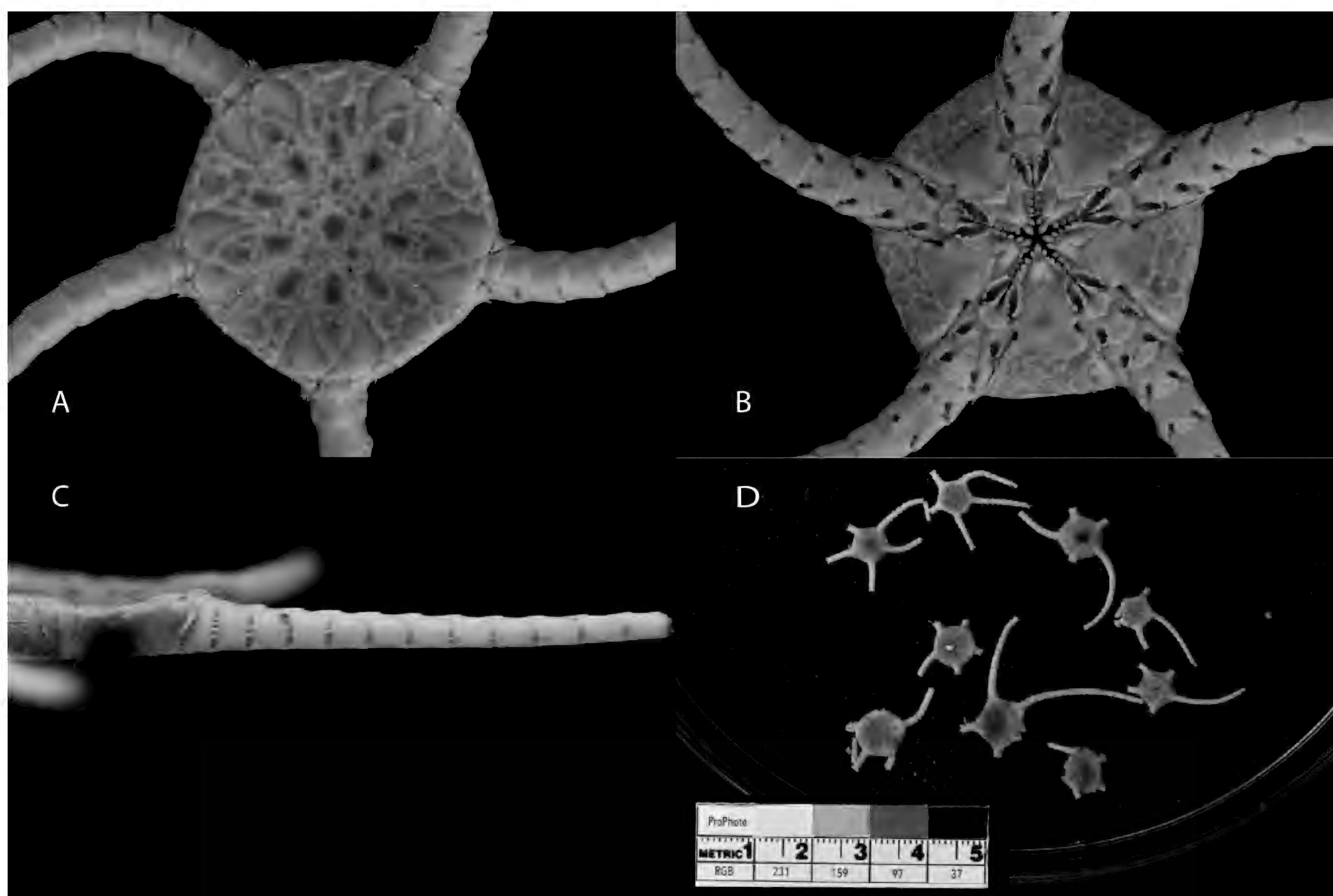
Ophiura aequalis (Lyman, 1878)

Figure 31. *Ophiura aequalis*. (A-C) NMV F305619 (Op 35, 6.5 mm dd) dried, (A) dorsal, (B) ventral, (C) lateral arm. (D) NMV F193468 (Op 2, to 8 mm dd) live colour.

Description of IOT material Disc to 10.5 mm dd, thick rounded margin, covered in small overlapping plates, primary plates distinct, bearing small slender spines; radial shields with acute divergent proximal tips, just touching distally; arm comb spiniform, opposing comb on DAP, genital papillae short spines; oral shields with notched lateral sides; DAPs oval to droplet-shaped, longer than wide, just contiguous; VAPs separate; 5-6 subequal arm spines to $\frac{1}{4}$ segment long; Reddish-

orange live colour.

Taxonomic remarks Differs from other *Ophiura* species with horn-shaped radial shields and small thorns on the disc plates, by having 5 or more short arm spines.

Distribution Tropical Indo-Pacific (582–2350 m), IOT (957–1850 m).

Ecology and life history Very abundant on seamount summits to the west of Christmas Island (1237–1643 m).

Ophiura micracantha H.L. Clark, 1911

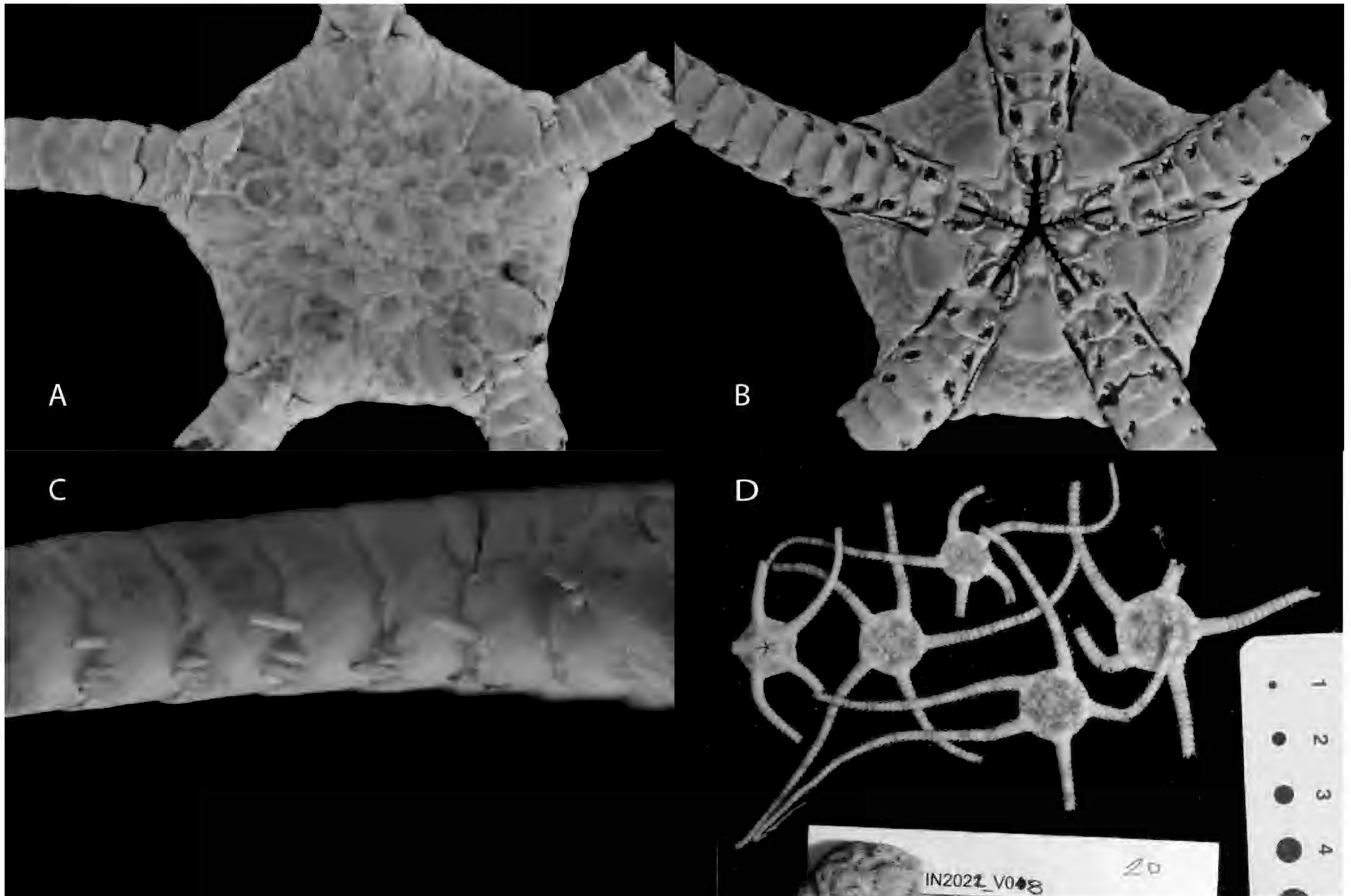


Figure 32. *Ophiura micracantha*. NMV F305626 (Op 16, 13 mm dd) dried (A) dorsal, (B) ventral, (C) lateral arm. (D) NMV F 308040 (Op 128, to 13 mm dd) live colour.

Description of IOT material Disc to 20 mm dd, covered in overlapping plates, primaries evident; radial shields 'eland'-shaped with wide rounded distal side and acute proximal angle, separate; dorsal arm comb papillae spiniform becoming rectangular laterally; oral shields with notched lateral sides; DAPs trapezoid, wider than long, contiguous; 3 arm spines, upper longest, middle one shortest.

Taxonomic remarks Possibly a species complex due to the large intra-specific genetic variation over its vast range.

Distribution Tropical Indo-Pacific (90–1416 m); IOT (404–1114m m), a deeper record (Op 131, 1589–1896 m) appears to be a label error.

Order Ophioscolecida

Family Ophiohelidae

Ophiomyces delata Koehler, 1904

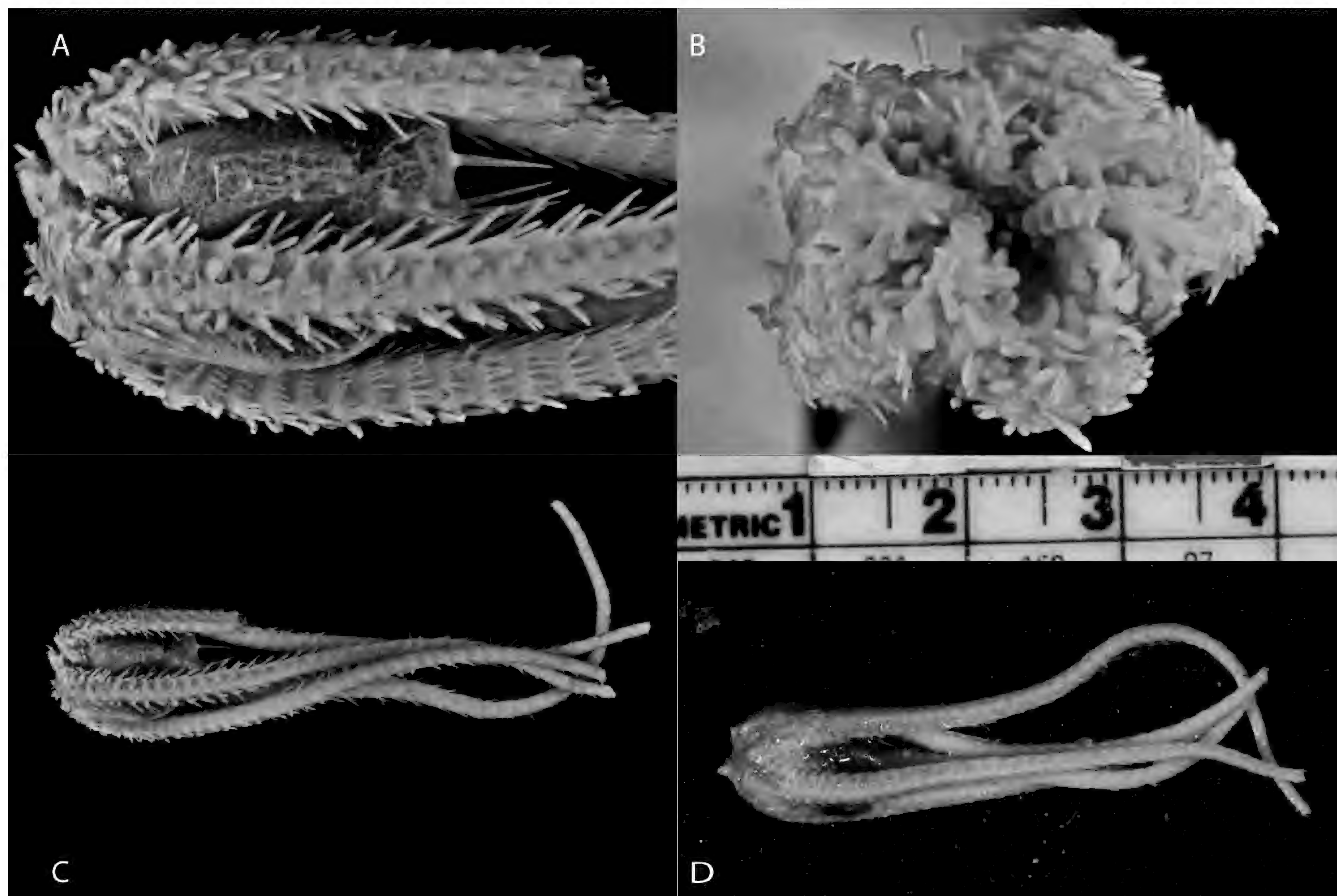


Figure 33. *Ophiomyces delata*. (A-D) NMV F307649 (Op 161, 8 mm dd) (A) lateral, (B) ventral, (C) whole body; (D) live colour.

Description of IOT material Disc to 8 mm dd, tall and conical, with long spines interradially; oral papillae in two series on each jaw, becoming flattened and widened distally (paddle-shaped); arms bent back against the disc; up to 15 flattened pointed arm spines, longest ventrally, series continues to the dorsal midline; no parasol-shaped arm spines; oval to lanceolate tentacle scales, inner one on VAP, outer 1-2 on LAP, reducing to one elongated scale on LAP from mid-arm.

Taxonomic remarks Differs from *Ophiotholia spathifer* in lacking umbrella-shaped arm spines, and having long disc spines and arm spines that continue to the midline of the dorsal arm surface.

Distribution Indo-West Pacific, from east Africa to the Nasca seamounts, Japan to New Zealand (75–1610 m); IOT (808–1451 m).

Ecology and life history Soft-sediment dweller.

Ophiotholia spathifer (Lyman, 1879)

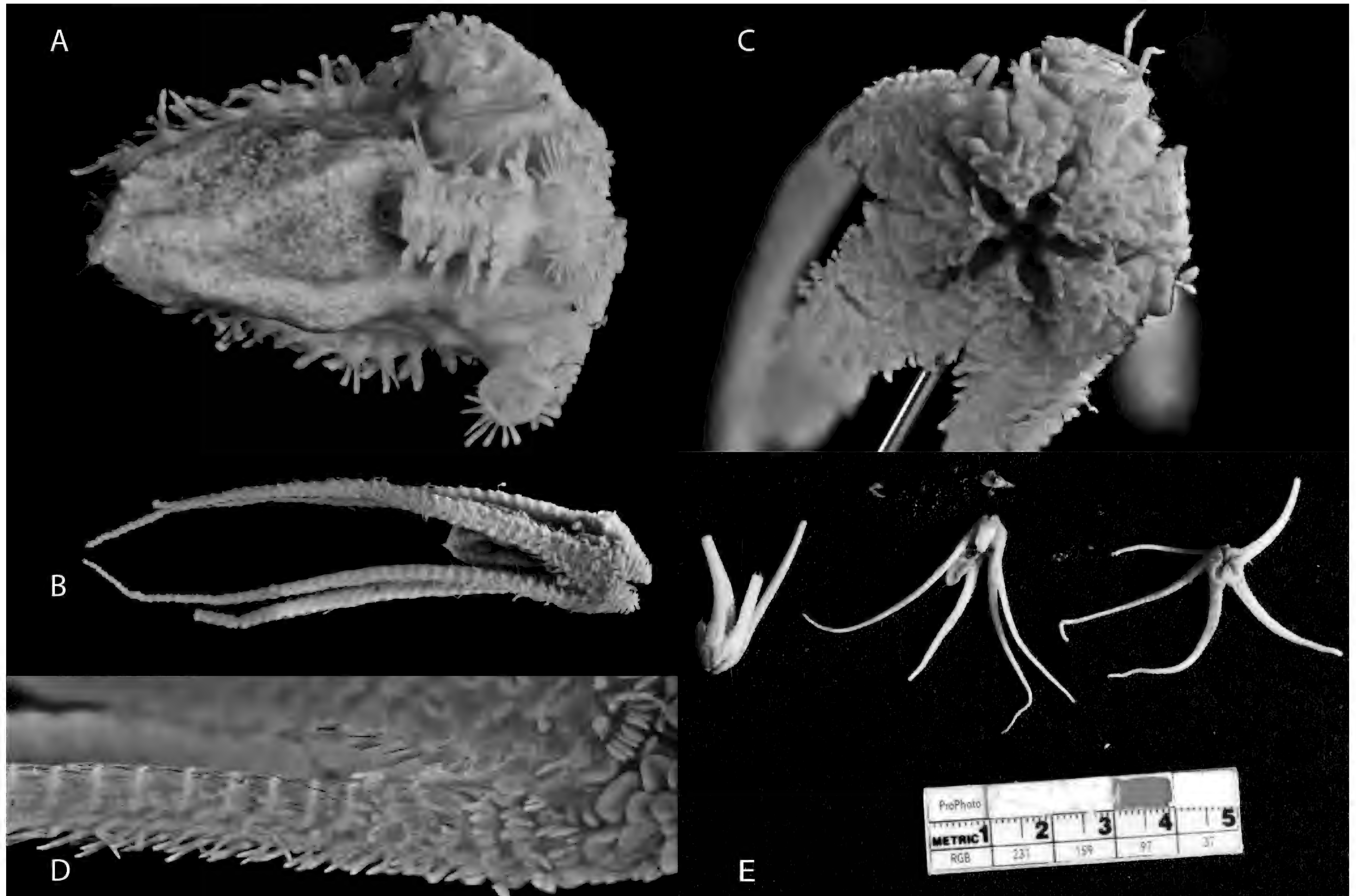


Figure 34. *Ophiotholia spathifer*. (A) NMV F307651 (Op 163, 10 mm dd) lateral view; (B-E) NMV F307648 (Op 159, 7 mm dd), (B) lateral view, (C) ventral, (D) lateral arm. (E) live colour.

Description of IOT material Disc to 7 mm dd, tall and conical, lacking large spines; whorls of oral papillae cover oral frame, cylindrical-shaped proximally, flattened and widened distally; tapering arms bent back behind the disc; arm spines not continuous across dorsal arm, umbrella-shaped spines can be present on distal arm, with a single-row of ribs (Eichsteller *et al.*, 2023, fig. 10c); numerous arm spines-tentacle scales are continuous across the ventral arm on the first segment. **Taxonomic remarks** The umbrella-shaped arm spines

are often difficult to see or removed during collection. However, the paucity of disc spines and the continuous row of arm spines across the ventral arm base clearly separate this species from *Ophiomyces delata*.

Distribution Tropical Indo-West Pacific, from Mascarene Archipelago to Nasca seamounts, southern Japan to northern New Zealand (120–1713 m); IOT (527–675 m).

Ecology and life history Soft-sediment dweller.

Family Ophioscolecidae

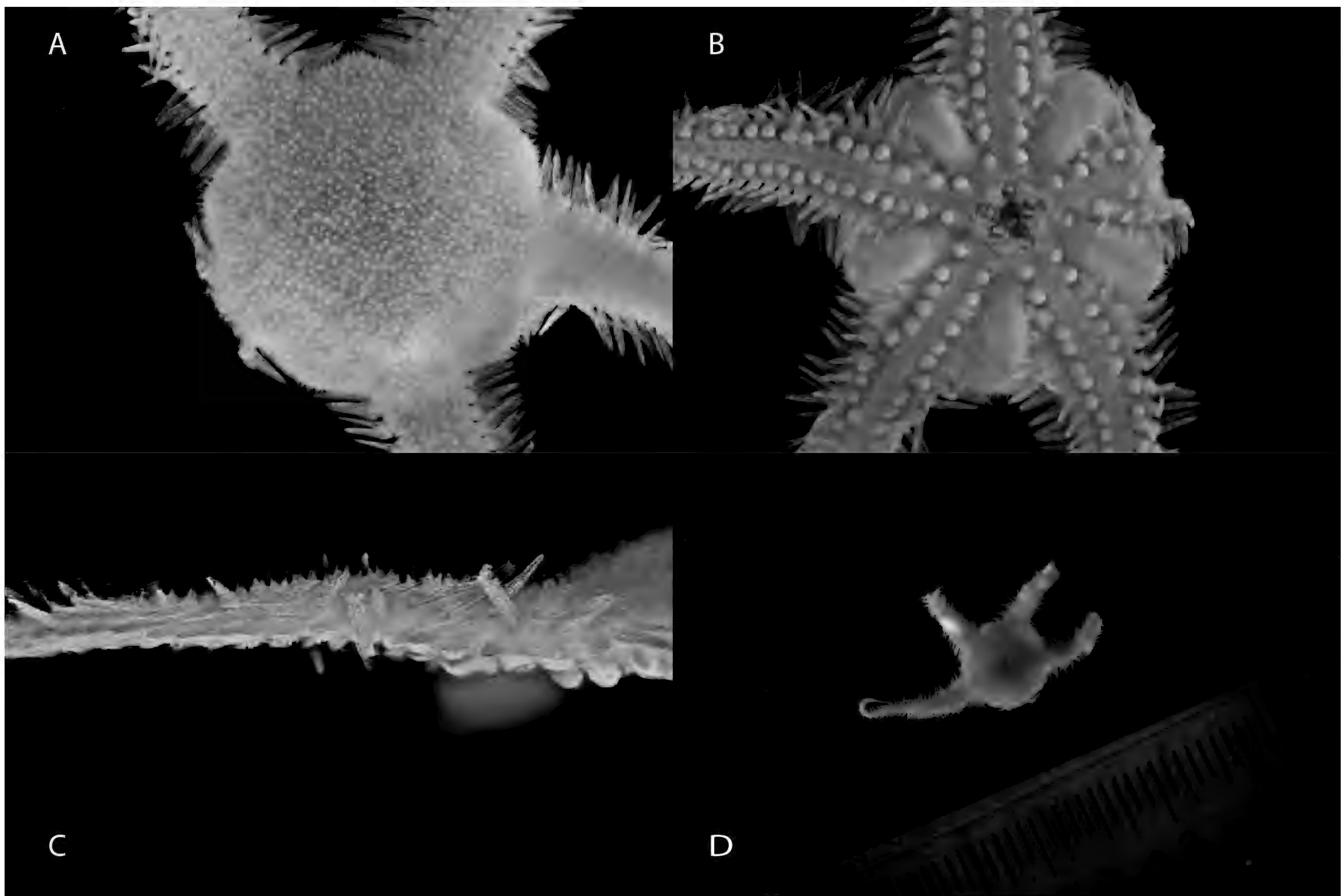
Ophiambix aculeatus Lyman, 1880

Figure 35. *Ophiambix aculeatus*. (A-D) NMV F307645 (Op 147, 7 mm dd) dried, one arm removed, (A) dorsal, (B) ventral, (C) lateral arm. (D) whole body.

Description of IOT material Disc to 7 mm dd, disc and dorsal arm surfaces covered in small sharp pyramid-shaped disc spines that obscure the underlying plates; thin circular disc plates visible ventrally; broad short (1.5x dd) arms not well demarked from the disc; tube feet large with bulbous nodulated apex; three lanceolate arm spines, lowest hook-like; tentacle scales tiny and spiniform.

Taxonomic remarks The familial position of this distinctive genus has long been debated, but new genetic data (Christodoulou *et al.*, 2019) indicates that it is a derived ophioscolecid, sister to *Ophiuroconis*. Paterson & Baker (1988) characterised this species as having taller

than wide pyramid-shaped disc spines, lanceolate arm spines (not widened apically) and small spinous tentacle scales. The extended bathymetric range reported for this species is suspect. The type specimen was from 2511 m, and it is possible that relatively shallow specimens are mis-identified or cryptic species.

Distribution East Indo-West Pacific (176–3350 m), IOT (1936–2721 m).

Ecology and life history Ingests wood debris, possibly living on the microbes that digest wood (Paterson & Baker, 1988).

Ophiolycus pertinax (Koehler, 1904)

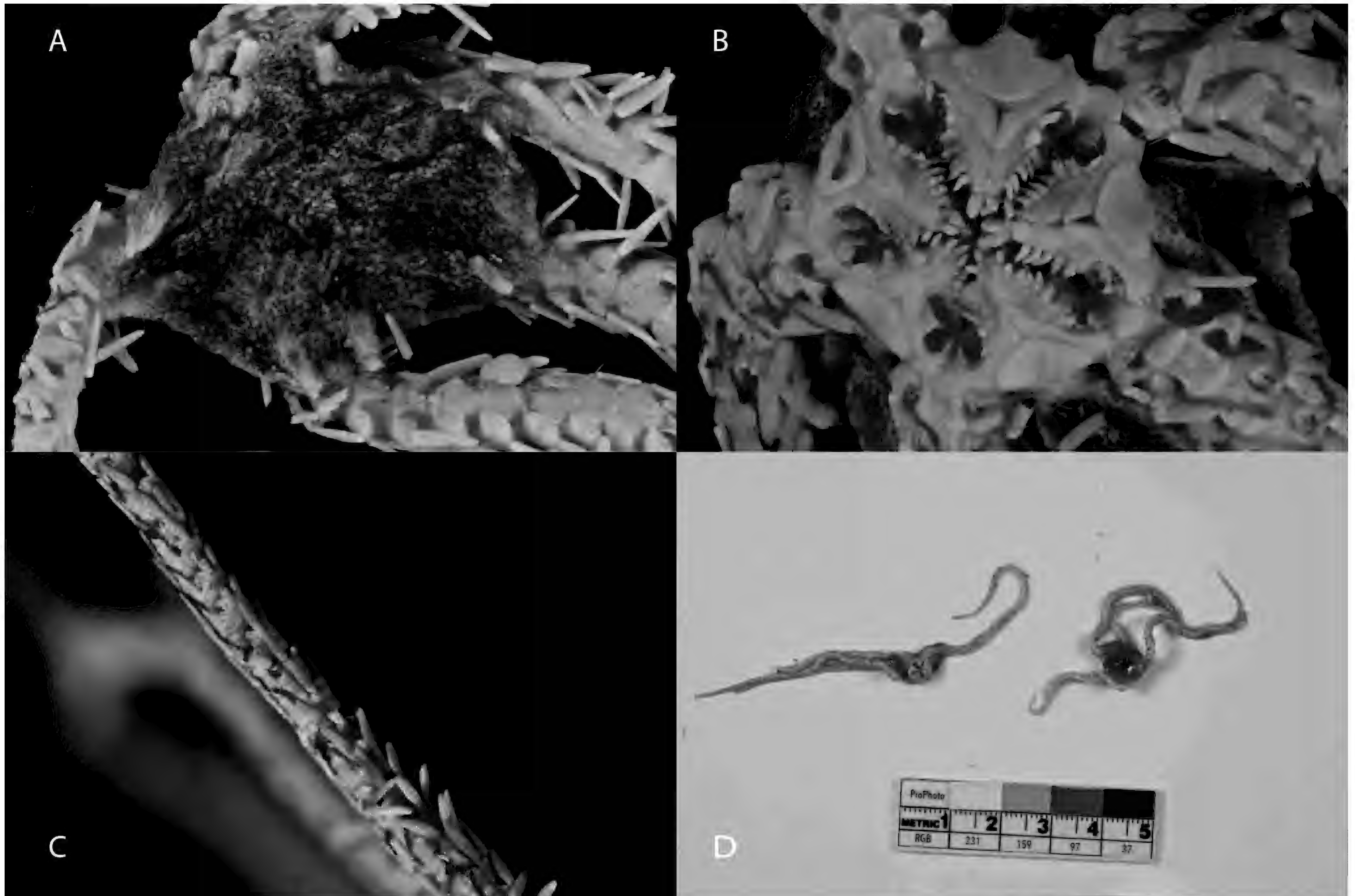


Figure 36. *Ophiolycus pertinax*. (A-D) NMV F305617 (Op 5, 10.5 mm dd) dried, one arm removed, (A) dorsal, (B) ventral, (C) lateral arm; NMV F305586 (Op 5, 12 mm dd) (D) live colour.

Description of IOT material Disc to 13 mm dd, covered in thick skin that obscured the small thin plates unless dried; radial shields evident bar-like separate, 1/8 dd in length; oral shield 2.5-3x as wide as long, broadly triangular; 4-5 proximal oral papillae with thorny tip, confluent with 3 slightly-taller scale-like ones around the second oral tentacle pore; 3 flattened bluntly-pointed arm spines, middle one shortest, 2 dorsalmost arm spines hook-shaped distally with 2 supplementary teeth; 2-1 oval to lanceolate tentacle

scales guard the large open pores.

Taxonomic remarks This species is considered here to belong to *Ophiolycus* rather than *Ophioscolex* as the holotype (ZMA E2468) has two dorsal hook-like arm spines on distal arm segments. This is the first report of this species since the type collection.

Distribution Tropical East Indo-West Pacific, from the IOT to New Caledonia, and north to Taiwan (204–1400 m), IOT (442–1114 m).

Ophioscolecidae sp.MoV.7345

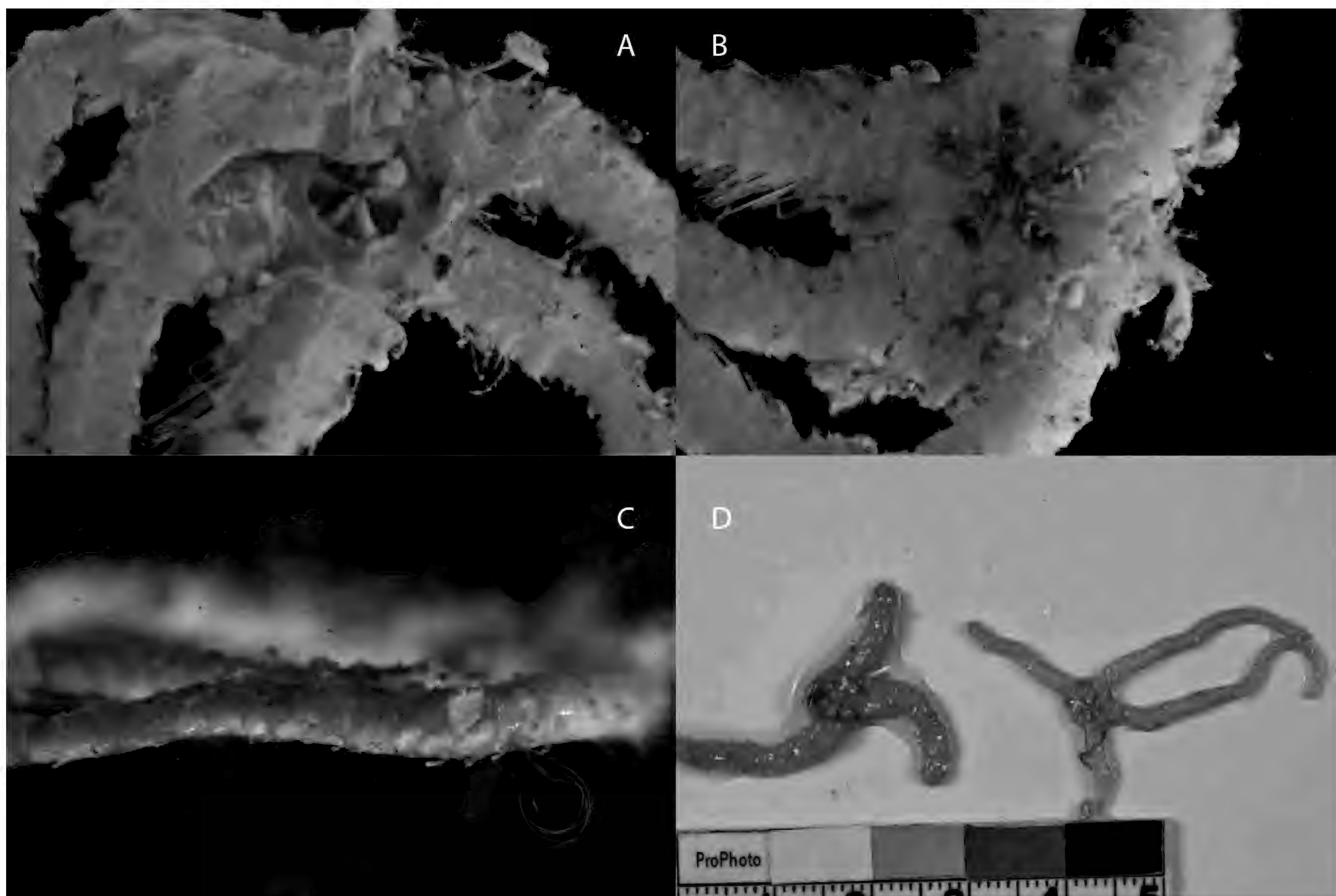


Figure 37. Ophioscolecidae sp.MoV.7345. (A-D) NMV F305519 (Op 5, 9 mm dd) preserved, (A) dorsal, (B) ventral, (C) arm, (D) live colour.

Description of IOT material Disc to 15 mm dd, disc torn or removed, but remaining pieces are covered in thin plates without any granules or spines; oral shields very large, triangular, wide as long; adoral shields long and thin; 2-3 apical tooth papillae and to 8 bluntly pointed oral papillae, rugose surface, distal 2 (oral tentacle scales) expanded and flattened; DAPs roughly triangular, with slightly convex to pointed distal edge, 2x wide as long, widely separate; VAPs octagonal, contiguous, with slightly concave lateral sides to accommodate the small tentacle pore; LAPs with extended flange, very striated and glassy; to 11

arm spines, hollow, glassy, slender, to 3 segments in length, semi-circular in cross-section, denticulate along edges; I large ovoid very thin and transparent tentacle scale, almost as long as the VAP; live colour: grey disc and reddish arms.

Taxonomic remarks These specimens are very damaged, making a morphological comparison difficult. DNA evidence (unpublished data) indicates a distant relationship to *Ophiuroconis* and *Ophiambix* within the Ophioscolecida.

Distribution IOT (643–997 m).

Order Ophiacanthida

Family Ophiacanthidae

Ophiacantha composita Koehler, 1897

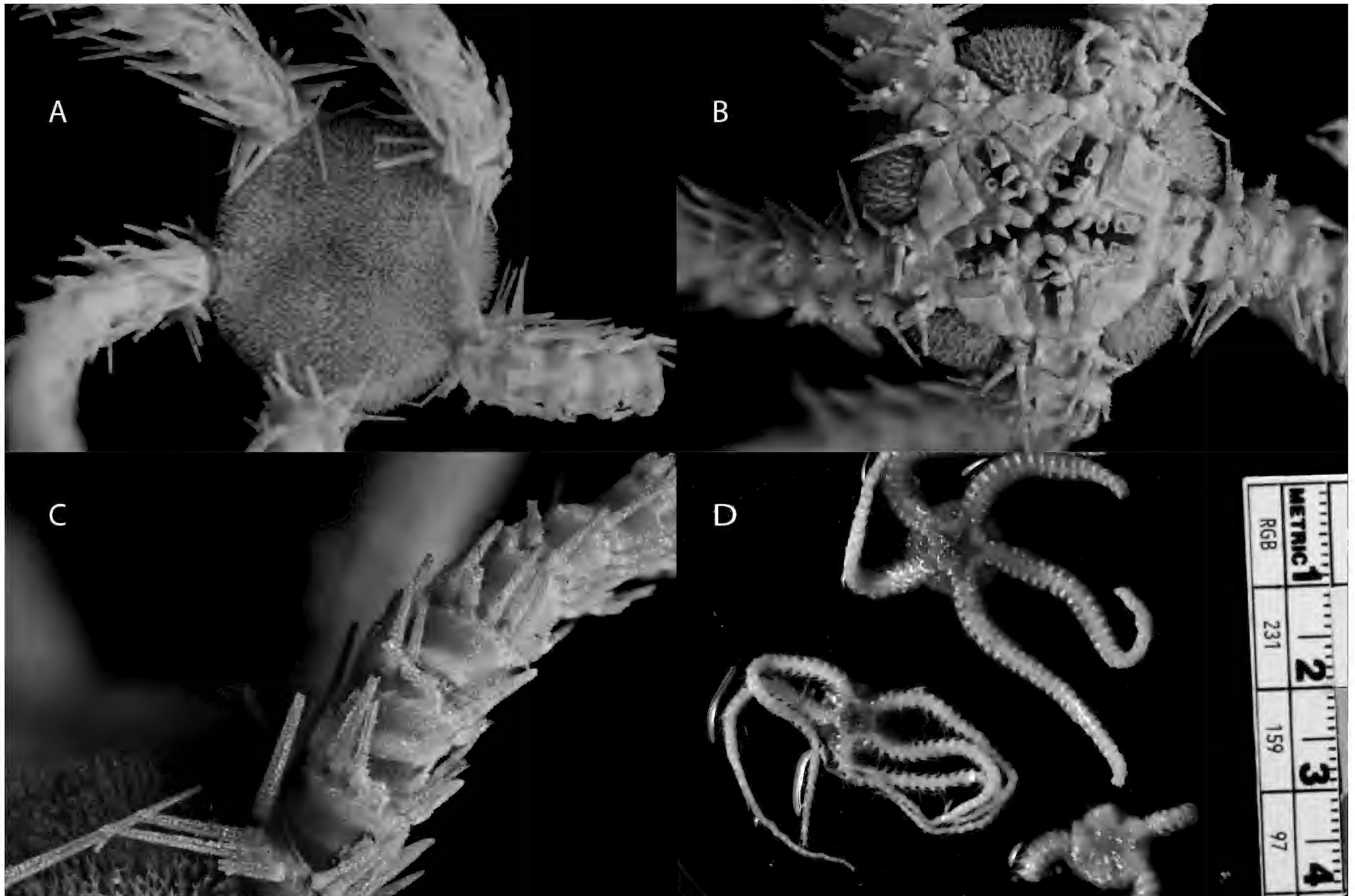


Figure 38. *Ophiacantha composita*. (A-C) NMV F305621 (Op 33, 7 mm dd) dried, (A) dorsal, (B) ventral, (C) lateral arm; (D) NMV F305538 (Op 31, 9 mm dd) live colour.

Description of IOT material Disc to 10 mm dd, covered in dense multifid spinelets, up to 4x as long as wide, with an irregular thorny pedicel, obscuring the radial shields and disc plates; oral shields broadly triangular with a convex outer edge, adoral shields meet interradially; 3 lateral oral papillae, outermost widened with an inner point; diamond-shaped VAP, 2x as wide as long; to 9 arm spines, with thorns around their base; one conical tentacle scale; live colour disc and arm base

brownish-red, ventral lighter colour.

Taxonomic remarks This is a lower bathyal species. The related upper bathyal Pacific species *O. levispina* has smooth arm spines.

Distribution Indo-West Pacific, from Africa to New Zealand, and north to the East China Sea (1000–3500 m); IOT (2189–3100 m).

Ecology and life history Epizoic.

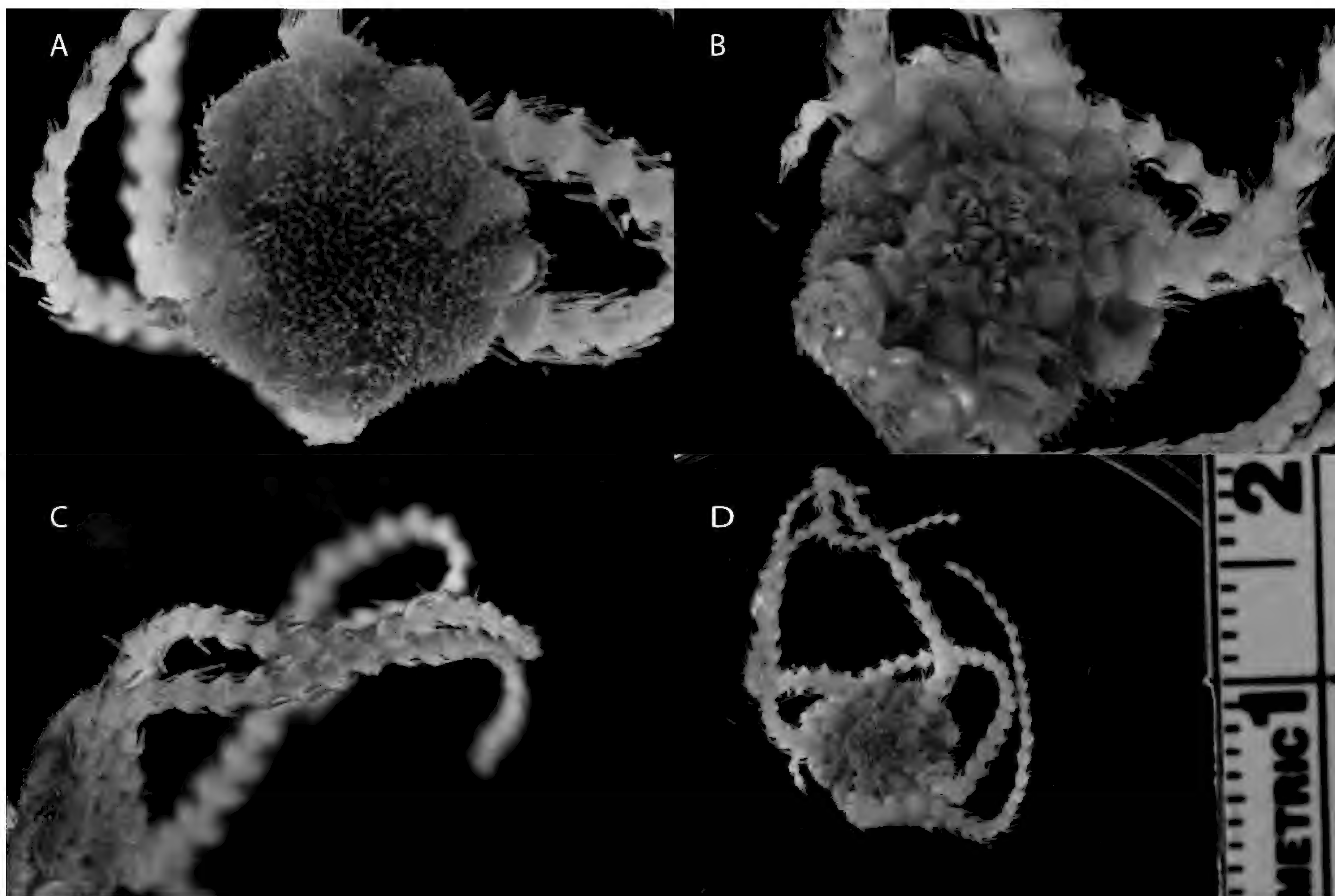
Ophiacantha exilis (Koehler, 1922)

Figure 39. *Ophiacantha exilis*. (A-D) NMV F305548 (Op 40, 6 mm dd) dried, (A) dorsal, (B) ventral, (C) lateral arm; (D) whole body.

Description of IOT material Disc to 6 mm dd, petaloid; covered in multifid spinelets, with a smooth pedicel and typically three primary thorns that bifurcate; radial shields bar-like, obscured by skin and spinelets; oral shields tending to cruciform with pointed proximal angle and rounded distal edge; 3-4 pointed oral papillae, outermost widened at base; arms moniliform (noded) with widely separated DAPs and VAPs; to 7 thorny

pointed arms spines, basal upper one to 2.5 segments in length; one tentacle scale, oval at arm base but becoming spiniform.

Taxonomic remarks These are the first records of this species since the holotype (5 mm dd) from Indonesia.

Distribution Indonesia (1280 m); IOT (1304–1663 m).

Ecology and life history Epizoic.

Ophiacantha cf. *funnebris* (Koehler, 1930)

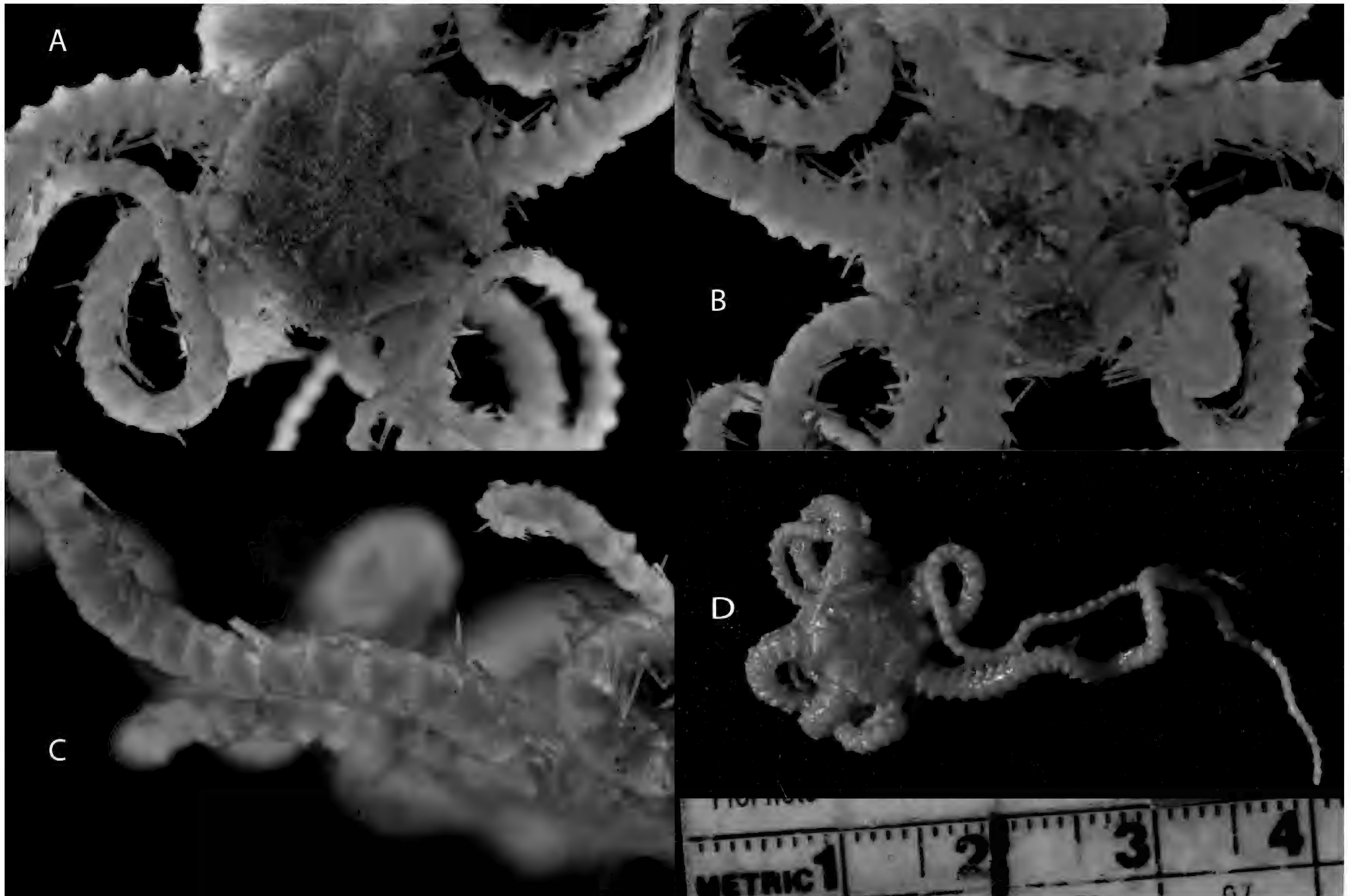


Figure 40. *Ophiacantha* cf. *funnebris*. (A-D) NMV F305528 (Op 37, 7 mm dd) dried, (A) dorsal, (B) ventral, (C) lateral arm; (D) live colour.

Description of IOT material Disc to 7 mm dd, pentagonal, covered in thin perforated plates that bear small stumps with an angular pedicel and expanded apex with 8-20 divergent thorns; radial shields long and thin exposed at their distal tips; oral shields 1.6x wider than long, with a convex outer border and an acute proximal angle; 3 oral papillae, outer 2 erect; arms long and tapering; DAPs fan-shaped separate; VAPs wider than long, distal edge convex and glassy; to 9 arm spines

with minute thorns; one long leaf-like tentacle scale, 2/3 the length of the VAP; live colour reddish.

Taxonomic remarks The IOT specimens are much deeper than previously recorded specimens and may represent a cryptic species.

Distribution Taiwan, Philippines, Indonesia, New Caledonia (245–700 m), IOT (1640–1850 m).

Ecology and life history Probably epizoic.

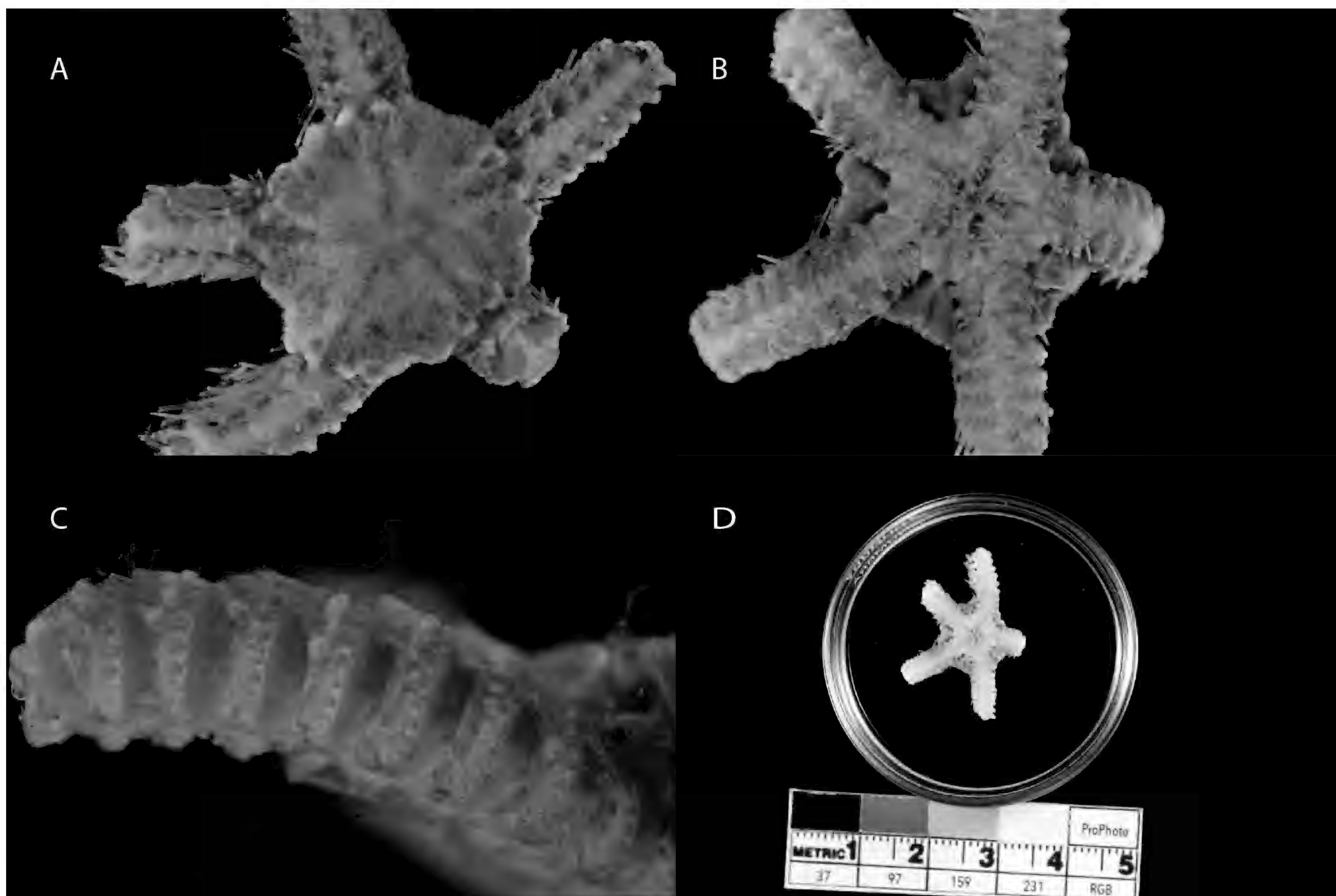
Ophiacantha fuscina O'Hara & Stöhr, 2006

Figure 41. *Ophiacantha fuscina*. (A-D) NMV F305555 (Op 16, 9 mm dd) preserved, (A) dorsal, (B) ventral, (C) lateral arm, (D) whole body.

Description of IOT material Disc to 9 mm dd, covered in disc plates bearing spinelets with 2-5 (typically 3) long webbed curved thorns; distal section of radial shields exposed; oral shields wider than long with a convex to lobed distal edge; 3, sometimes 4, spiniform lateral oral papillae; VAPs with a convex striated distal edge; 10-11 arm spines, upper smooth, lower ones with thorns, lowest flattened with a series of long thorns along the proximal side; 1 oval tentacle scale with a thorny pointed tip.

Taxonomic remarks This species belongs to a complex of species including *O. longidens* and *O. linea* from Korea. More work is required to establish species limits. The superficially similar species *Ophiotreta larissae* differs in having more than 4 oral papillae.

Distribution Indo-West Pacific from Madagascar to New Zealand, and north to the Philippines (90–1412 m); IOT (781–1114 m).

Ecology and life history Epizoic.

Ophiacantha longidens Lyman, 1878

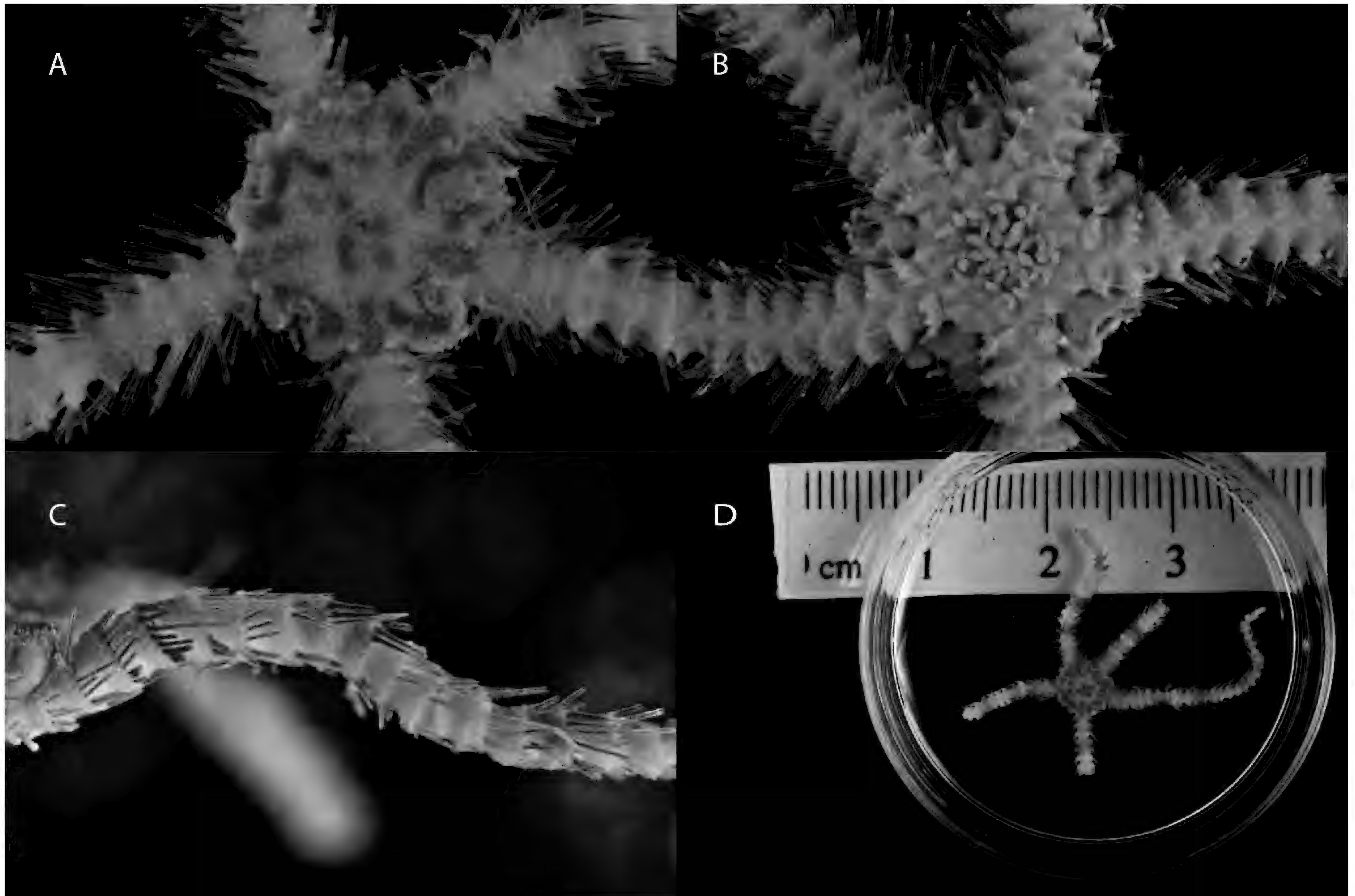


Figure 42. *Ophiacantha longidens*. (A-D) NMV F308099 (Op 163, 6.5 mm dd) preserved, (A) dorsal, (B) ventral, (C) lateral arm, (D) whole body.

Description of IOT material Disc 6.5 mm dd, disc outline undulating, spines with long pedicel and 3 or more short terminal thorns; radial shields on exposed at distal tip; oral shields rhombic, 2x as wide as long; adoral shields beaded; 3 stout lateral oral papillae; arms not moniliform; DAPs glassy fan-shaped wider than long separate; VAPs hexagonal with obtuse proximal and distal angles and concave sides, as wide as long, separate; to 10 arm spines, slender pointed, upper ones to 2x segment in length, lower ones with sparse thorns; one oval to pointed tentacle scale, thorny tip, almost

as long as the VAP; colour: disc grey with brown markings peripherally and centrally, arms banded brown/white in 1-3 segment blocks.

Taxonomic remarks *Ophiacantha* species can be difficult to identify. This species has simpler smaller disc spines and thinner ventral arm spines than *O. fuscina*, the arms are not noded like *O. pentagona* and *O. exilis*.

Distribution Tropical Indo-West Pacific from Madagascar to French Polynesia, New Zealand north to southern Japan and Hawaii (36–1478 m); IOT (528–527 m).

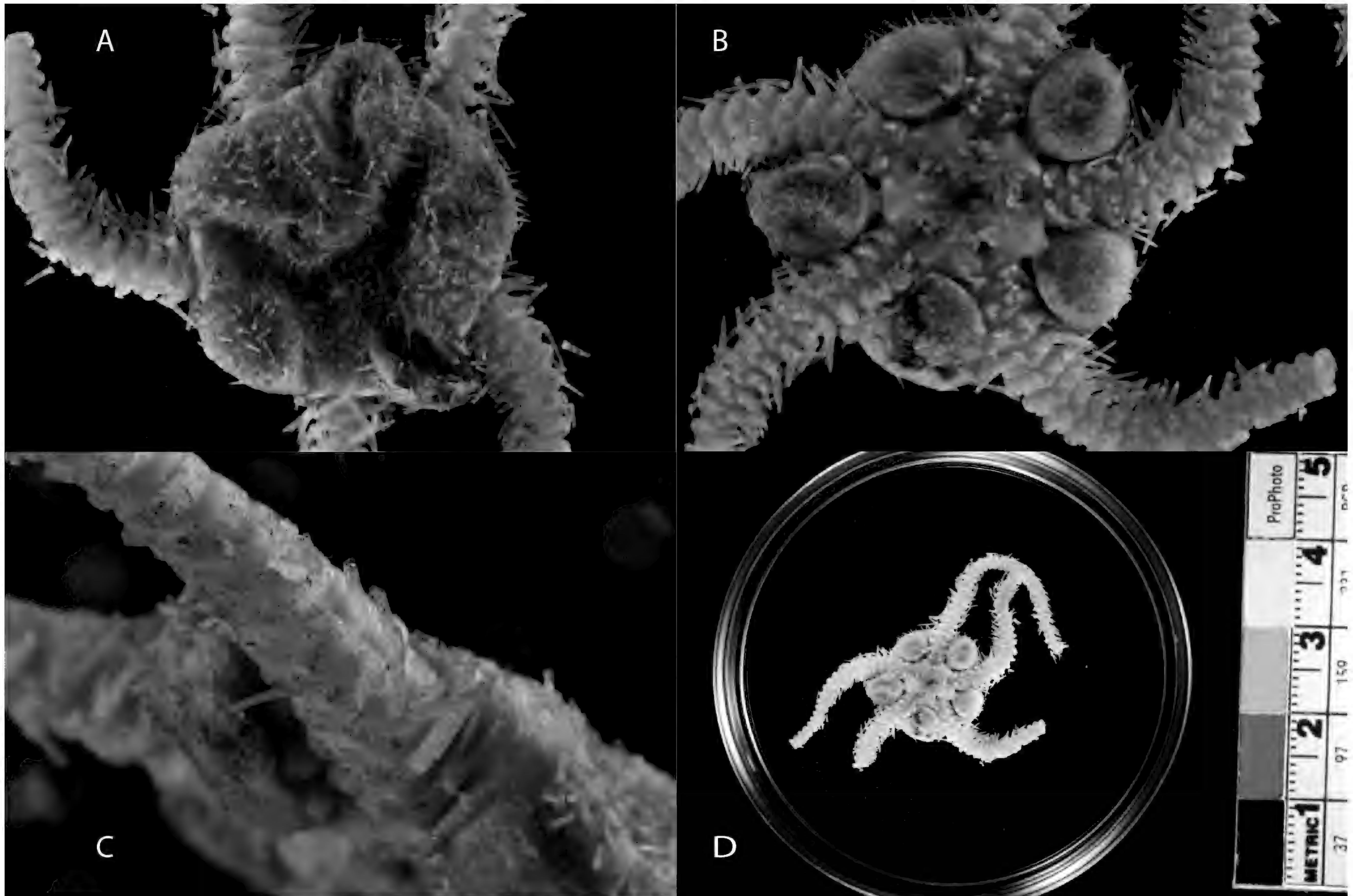
Ophiacantha pacata Koehler, 1922

Figure 43. *Ophiacantha pacata*. (A-D) NMV F305527 (Op 37, 11 mm dd) preserved, (A) dorsal, (B) ventral, (C) lateral arm, (D) whole body.

Description of IOT material Disc to 11 mm dd, pentagonal, puffed out interradially; disc plates buried within thick skin, spines sparse, rod-like, 5x longer than wide, apex minutely thorny; oral shields broadly triangular, with pointed proximal apex; thick adoral shields contiguous interradially; teeth with a thin rounded cutting edge; oral papillae smaller but similar, overlapping; arms not noded; DAPs bell-shaped, just separated; VAPs wider than long, rounded distally, separate; to

8 hollow arm spines, uppermost smooth, lower ones with denticulate ventral edge; one large thick, conical to bent tentacle scale.

Taxonomic remarks Sister species to *O. crassidens* from the North Atlantic.

Distribution East Indo-West Pacific, from the IOT to New Zealand and north to the Philippines (335–1850 m); IOT (1640–1850 m).

Ophiacantha pentagona Koehler, 1897

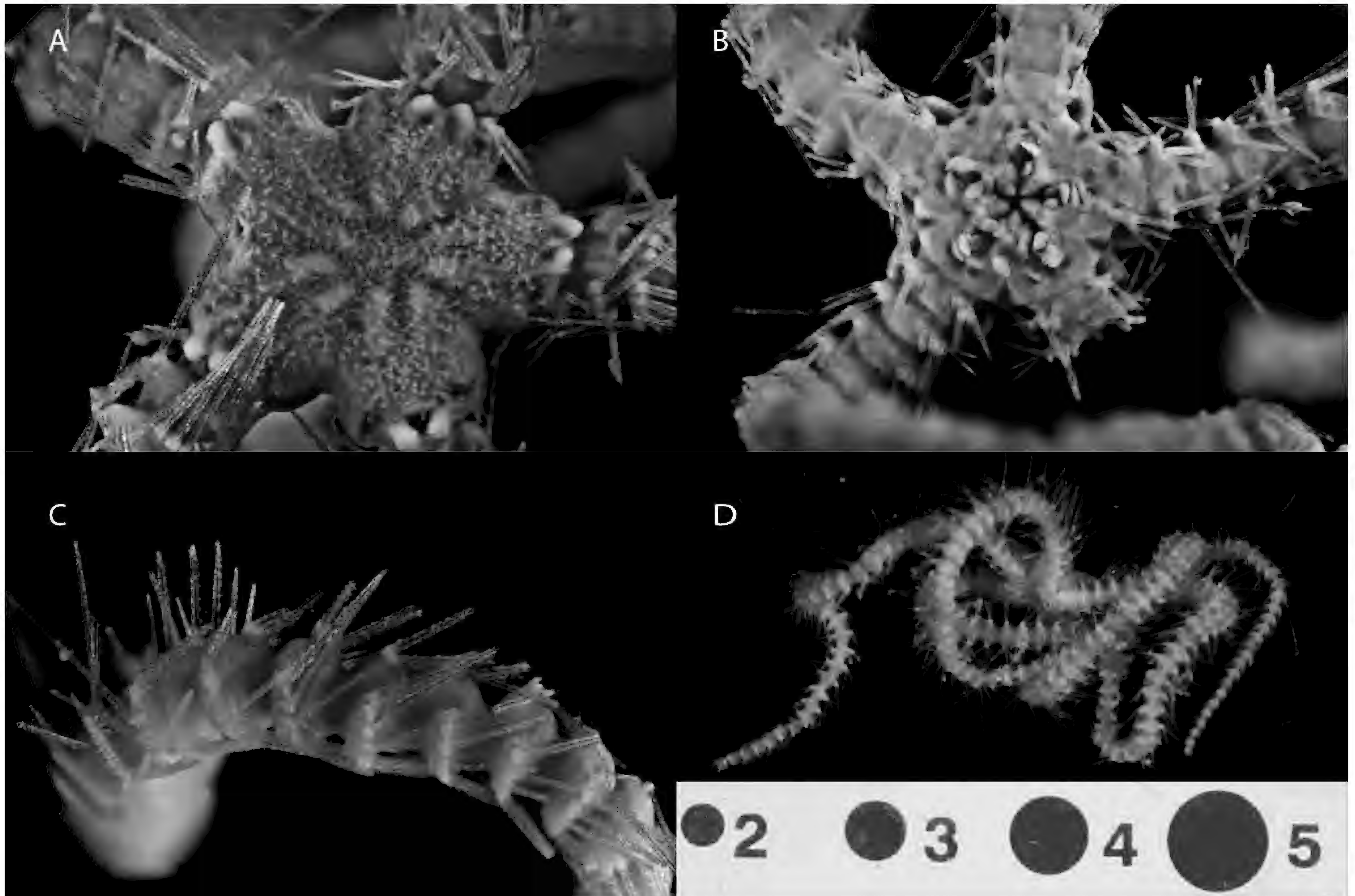


Figure 44. *Ophiacantha pentagona*. (A-D) NMV F308042 (Op 128, 8 mm dd) preserved, (A) dorsal, (B) ventral, (C) lateral arm; (D) live colour. (Circles in mm.)

Description of IOT material Disc to 8 mm dd, indented interradially, covered in spinelets with a smooth pedicel and mostly 3 apical thorns (but some with more); radial shields hockey-stick shaped, parallel, distal section exposed; 3 spiniform lateral oral papillae; oral shields smaller than adoral shields, wider than long, cruciform; adoral shields finely beaded; arms moniliform (especially distal to mid arm), curved and twisted; to 8 thin thorny arm spines, uppermost to 4 segments long; one

tiny pointed tentacle scale.

Taxonomic remarks This widespread species is likely to contain cryptic species (O'Hara & Stöhr, 2006).

Distribution Indo-West Pacific, from east Africa to Moorea, Japan to New Zealand (66–1950 m); IOT (365–527 m).

Ecology and life history Epizoic.

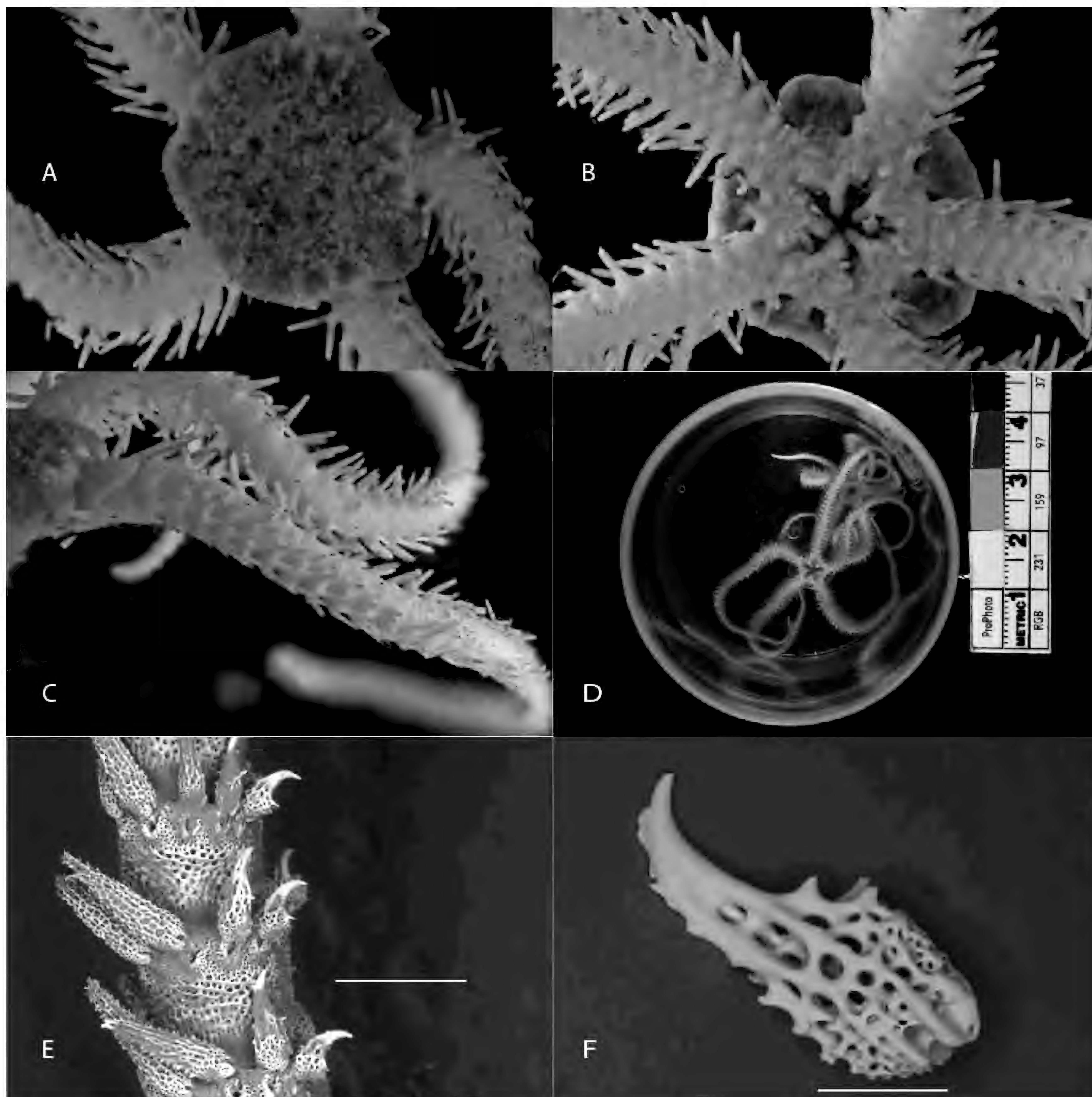
Ophientrema scolopendrica (Lyman, 1883)

Figure 45. *Ophientrema scolopendrica*. (A-D) NMV F305545 (Op 35, 8 mm dd) dried, (A) dorsal, (B) ventral, (C) lateral arm; (D) live colour, (E) SEM distal arm (scale bar=500µ), (F) SEM distal arm hook (scale bar=100µ).

Description of IOT material Disc to 8 mm dd, rounded margin, covered in thick skin and plates only evident near the radial shields; small (0.25 mm high) sparse conical disc spines present; distal half of radial shields exposed; oral shields axe-head shaped, wider than long, with prominent distal lobe; prominent rounded teeth; 3 lateral oral papillae with denticulate tip, a gap occurring between the distalmost papillae and the end of the jaw slit; DAPs hexagonal, 2x wide as long, contiguous; to 7 arm spines, upper smooth stout and bluntly pointed, to 2 segments long, lower 3-4 arm

spines become modified into hooks (Fig. E, F) from 4th segment; tentacle pore large, with 1 scale on basal plates, replaced by lower arm spine hooks; live colour reddish.

Taxonomic remarks This species is identifiable by the 3-4 hook like lower arm spines. Its only relative is *O. euphylactea* from Japan.

Distribution Indo-West Pacific, from Mozambique Channel to New Zealand and north to Japan (779–1930 m); IOT (1285–1350 m).

Ophiocanops sp.MoV.7346

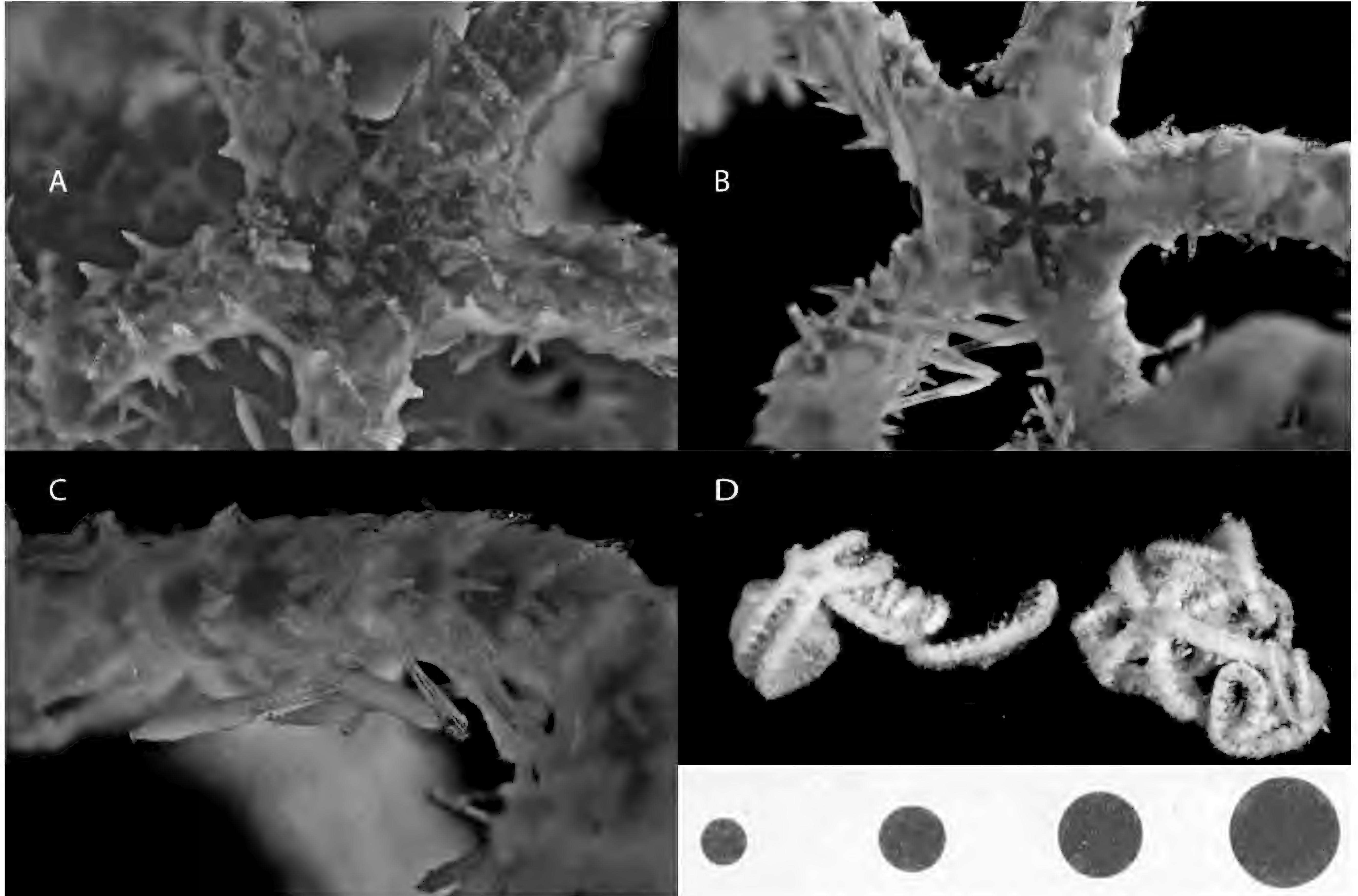


Figure 46. *Ophiocanops* sp.MoV.7346. (A-D) NMV F308045 (Op 128, 3 mm dd) dried, (A) dorsal, (B) ventral, (C) lateral arm; (D) live colour. (Circles in mm.)

Description of IOT material Disc 3 mm dd, covered in thin skin (mostly torn) with perforated plates; gonads present in arms; oral shields small land triangular, smaller than large contiguous beaded adoral shields; teeth conical with a spinose tip with 2 similar lateral oral papillae; 5-6 arm spines, upper spine appears to support dorsal skin, then 3-4 smaller spines, lowest becomes a long clavate spine after the 3rd segment, to

3 segments in length; no tentacle scales.

Taxonomic remarks This specimen differs from the three known species of *Ophiocanops* in having a very long ventral spine with bulging integument near the tip.

Distribution IOT (328–404 m).

Ecology and life history Epizoic on black coral.

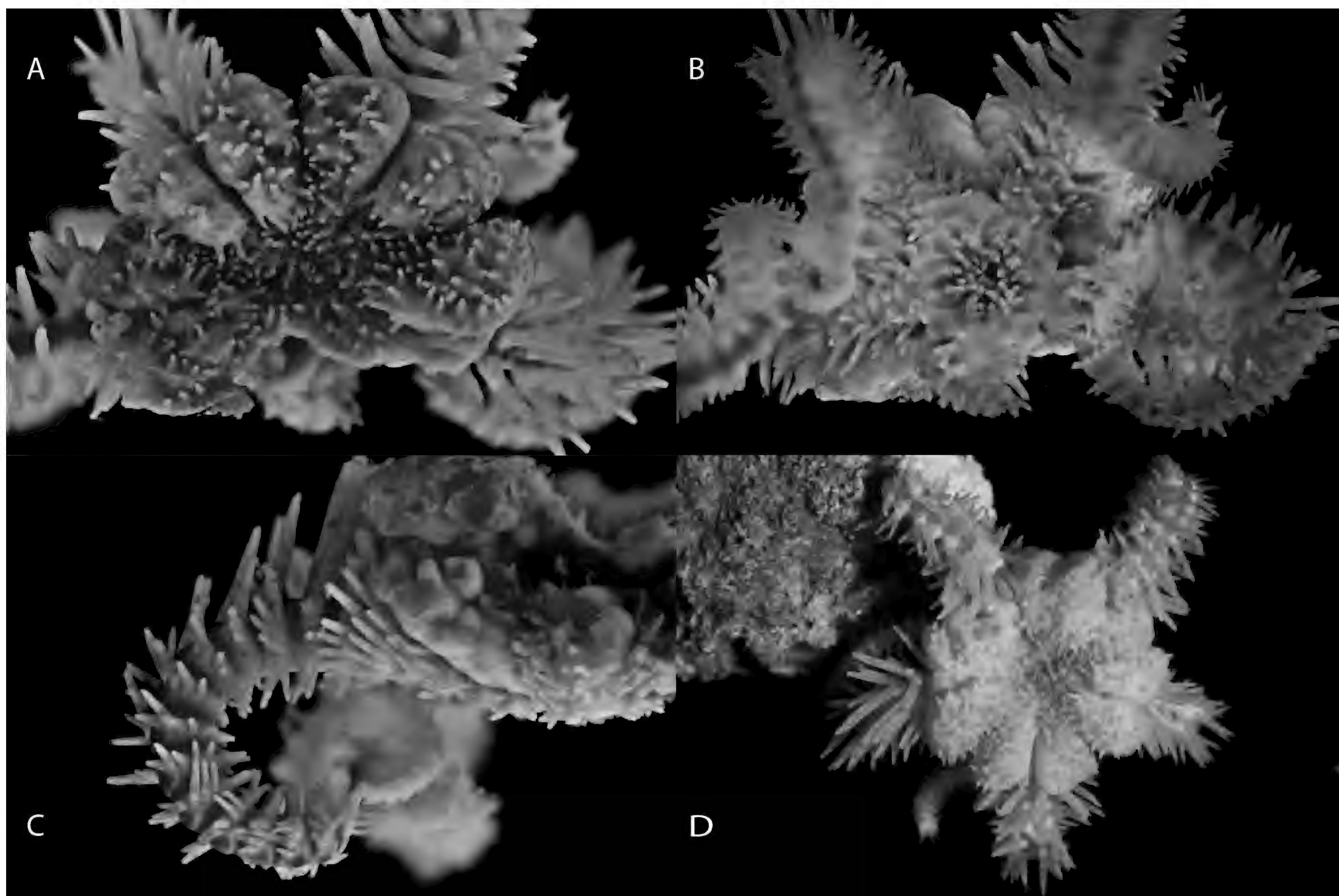
Ophiolebes cf. *comatulina* McKnight, 2003

Figure 47. *Ophiolebes* cf. *comatulina*. (A-D) NMV F308051 (Op 134, 9 mm dd) preserved, (A) dorsal, (B) ventral, (C) lateral arm; (D) live colour (originally wrapped around crinoid).

Description of IOT material Disc to 9 mm dd, expanded over radial shields and incised interradially and radially to form 10 wedges around disc periphery; covered in disc plates that bear simple conical to waisted disc spines without thorns; radial shields bar-like but hidden in radial slit; oral shields cruciform, as long as wide, with distal lobe and acute proximate angle; 3 polygonal and contiguous lateral oral papillae; DAPs fan-shaped wider than long; VAPs 2x wider than long, convex distal margin, separate; to 7 round arm bluntly pointed hollow spines, uppermost enlarged basally to 4.5 segments long; single tentacle scale oval

to leaf-shaped; live colour pinkish with orange-brown markings down dorsal arms.

Taxonomic remarks This specimen is similar to *Ophiolebes comatulina* from New Zealand, which was also found on a crinoid, in having enlarged upper arm spines, obscured radial shields, thick tentacle scales and cruciform oral shields. But the types of *O. comatulina* differ in having pointed separate oral papillae.

Distribution IOT (353–356 m).

Ecology and life history Epizoic on the oral disc of a crinoid, with arms curled around the theca.

Ophiomoeris obstricta (Lyman, 1878)

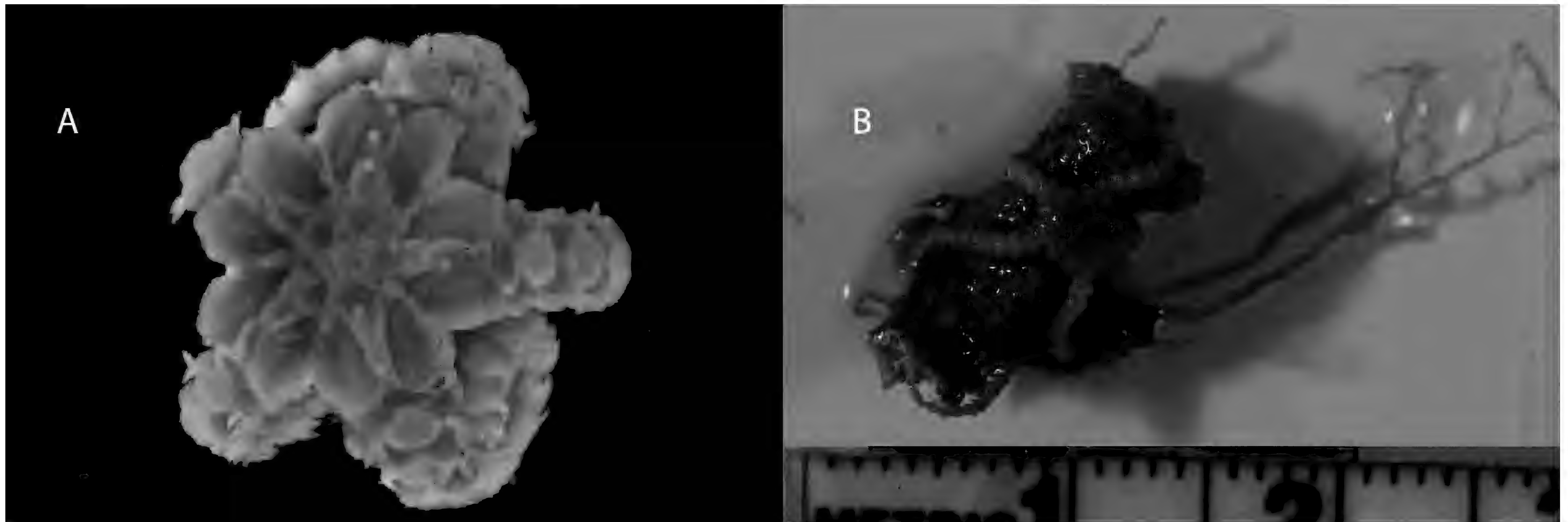


Figure 48. *Ophiomoeris obstricta*. (A-C) NMV F305517 (Op 5, 5 mm dd) preserved, (A) dorsal, (B) NMV F308037 (Op 126, 5 mm dd) live colour.

Description of IOT material Disc to 6 mm dd, covered in overlapping plates between the large radial shields, primaries evident just proximal to the radial shield; radial shields $\frac{1}{4}$ dd, 2x as long as wide, proximally divergent, radially separated but interradially can be separated by a notch or contiguous; some small granules radially and interradially; 3 polygonal oral papillae and pointed apical tooth; arms moniliform, curled under; DAPs 2x as wide as long, hexagonal, separate; VAPs 2x wide as long, separate; 5 then 4 pointed arm spines, lowest longest, less than a segment in length; 1 small tentacle scale; Colour brown disc and

white arms.

Taxonomic remarks Specimens identified as *Ophiomoeris obstricta* (even within the IOT) are very variable and this taxon probably contains cryptic species. The recently described species *O. exuta* is placed within this genetic complex.

Distribution Indo-Pacific, from Madagascar to the Nazca seamounts off Chile, Japan to Tasmania (50-1901 m); IOT (328-1139 m).

Ecology and life history Epizoic.

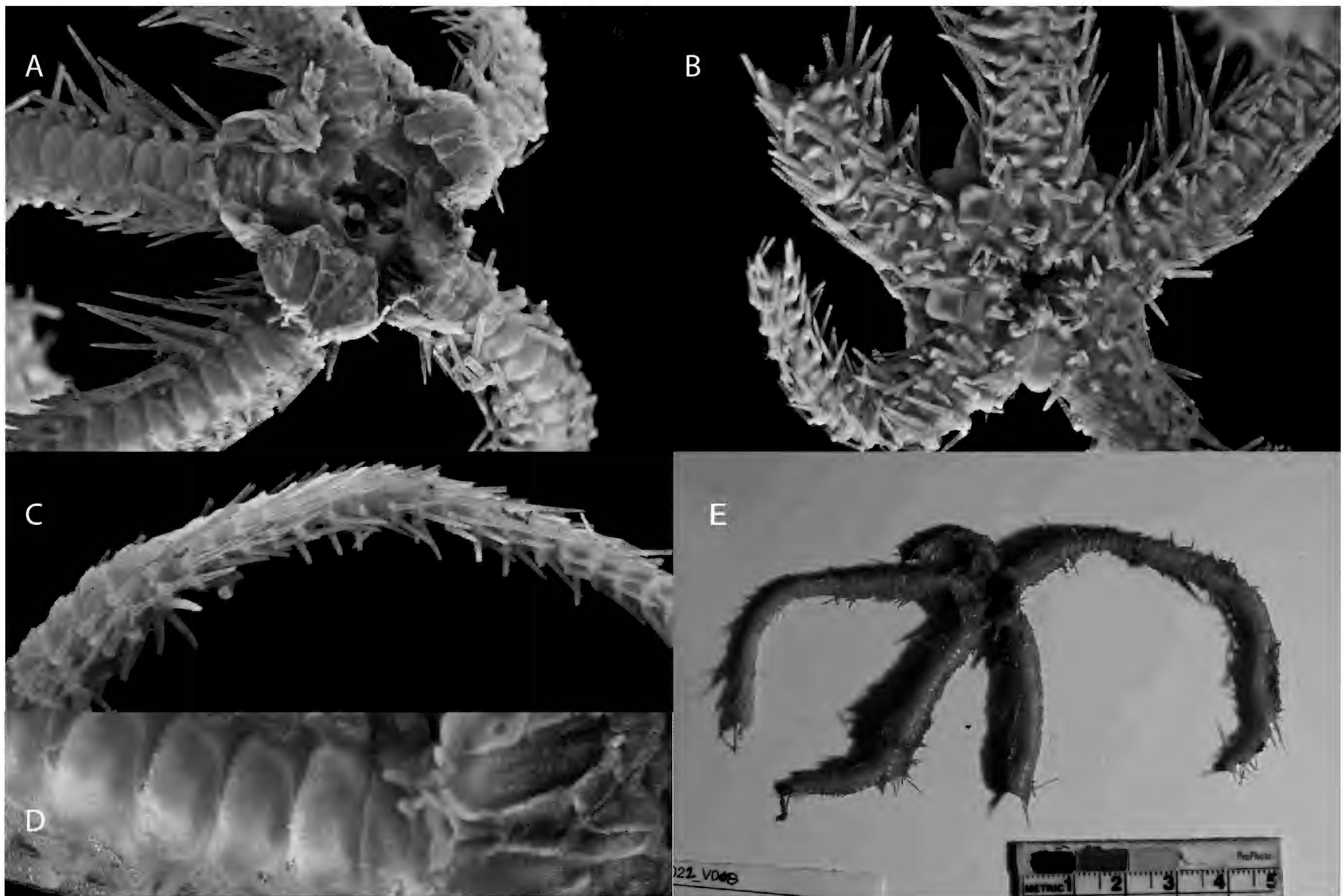
Ophioplinthaca bythiaspis (H.L. Clark, 1911)

Figure 49. *Ophioplinthaca bythiaspis*. (A-E) NMV F308050 (Op 131, 14 mm dd) preserved, (A) dorsal, (B) ventral, (C) lateral arm, (D) spinous dorsal arm plates, (E) live colour.

Description of IOT material Disc to 14 mm dd, covered in coarse overlapping plates, disc stumps spherical to conical shaped, without notable thorns; radial shields quadrangular or slightly curved, 2.5x longer than wide, separated by 1-2 series of plates, sunken below disc plates; oral shields as long as wide with convex to lobed thickened distal margin; 4-5 spiniform lateral oral papillae; DAPs broadly trapezoid, with convex uplifted slightly-spinose distal margin, and obtuse proximal angle, separate; to 5 arm spines, upper to 3.5 segments, lower spines more denticulate; 1-2 curled leaf-like tentacle scales on basal segments, becoming more spiniform; live colour: reddish-orange.

Taxonomic remarks The species distinction between this species, *O. athena* from the NW Pacific, and *O. chelys* from the Atlantic need to be resolved. All have long separated radial shields and simple conical disc stumps. The IOT specimen is clusters with a specimen identified (Nethupul *et al.*, 2022) as *O. athena* from SE of Guam. We lack DNA samples from the type localities of *O. bythiaspis* (Japan) and *O. athena* (Hawaii) to fully resolve the issue.

Distribution East Indo-West Pacific (995–3500 m); IOT (1589–1896 m).

Ecology and life history Epizoic.

Ophioplinthaca globata Koehler, 1922

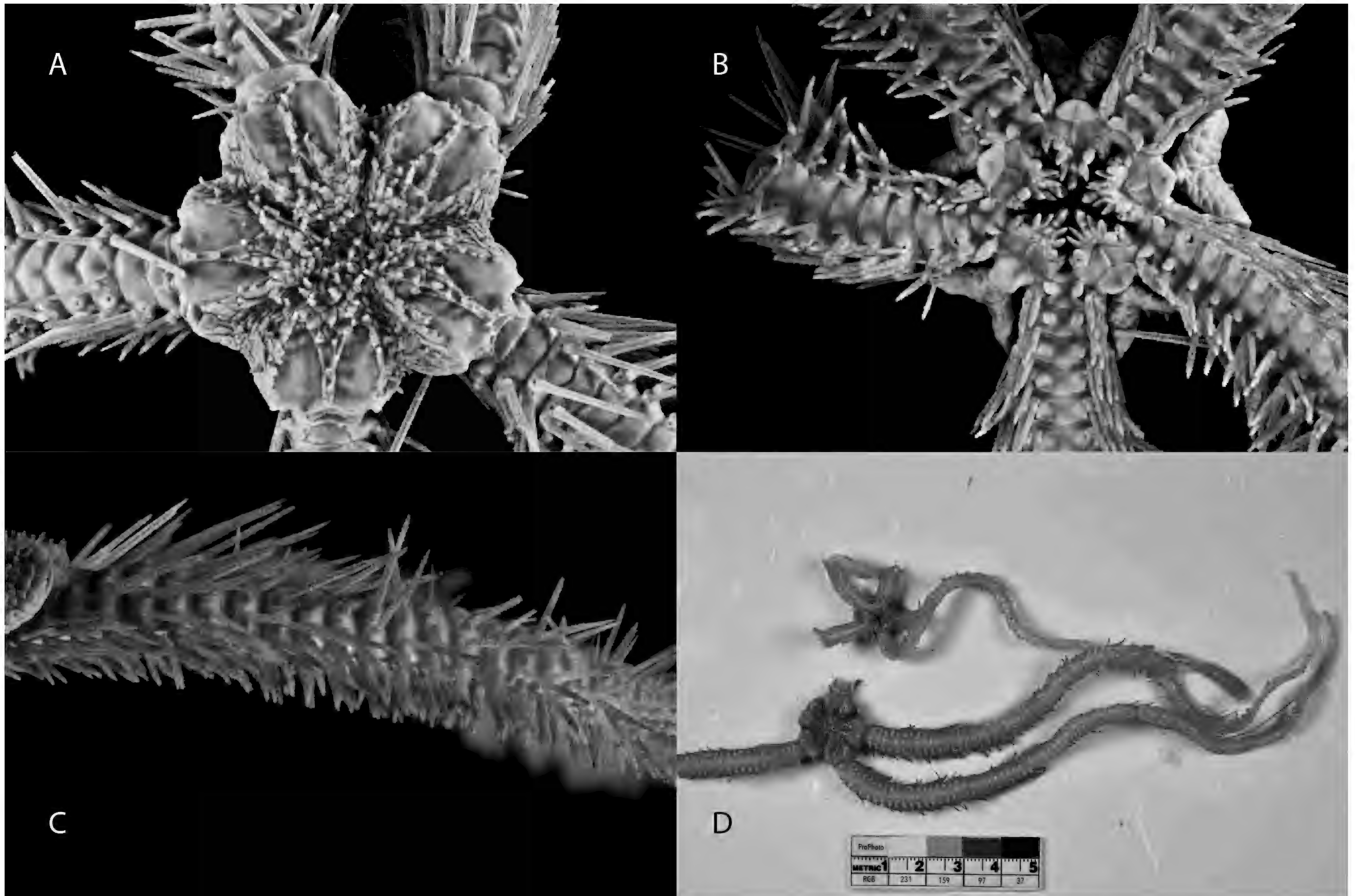


Figure 50. *Ophioplinthaca globata*. (A-C) NMV F305616 (Op 5, 16 mm dd) preserved, (A) dorsal, (B) ventral, (C) lateral arm; (D) NMV F 305587 (Op 5, 18 mm dd) live colour.

Description of IOT material Disc to 18 mm dd, margin indented interradially, covered in coarse overlapping disc plates of various sizes, bearing stumps pear-shaped with bulbous base and tapering to a rounded apex with 3 to many thorns, 2-3x as high as wide; radial shields 1/5-1/6 dd, 2x higher than wide, just separated distally by a narrow series of plates; oral shields 2x as wide as long with a convex distal edge and obtuse proximal angle, often sunken centrally; 3-4 oral papillae, outer lowest but widest; base of 2nd oral tube foot covered with small granular plates; arms long and robust; DAPs 2x as wide as long, with a convex distal margin and obtuse proximal angle, separate; VAPs 2x wider than long, distal edge convex with a swollen central portion; to 6 hollow tapering arm spines, upper longest, to 4 segments in length, lower ones with fine thorns; one

round to oval thick tentacle scale, articulates on LAP but often extends longitudinally over small tentacle pores; Live colour: grey central disc with reddish margins, arm spines also red, especially near disc, tube feet and oral frame also red.

Taxonomic remarks The numerous species of *Ophioplinthaca* are difficult to separate and key characters with disc stumps and radial shields can be variable. The identification of these species as *O. globata* was confirmed by DNA samples.

Distribution East Indo-West Pacific from the IOT to New Caledonia, and north to the Philippines (347–1013 m); IOT (643–1114 m).

Ecology and life history Epizoic.

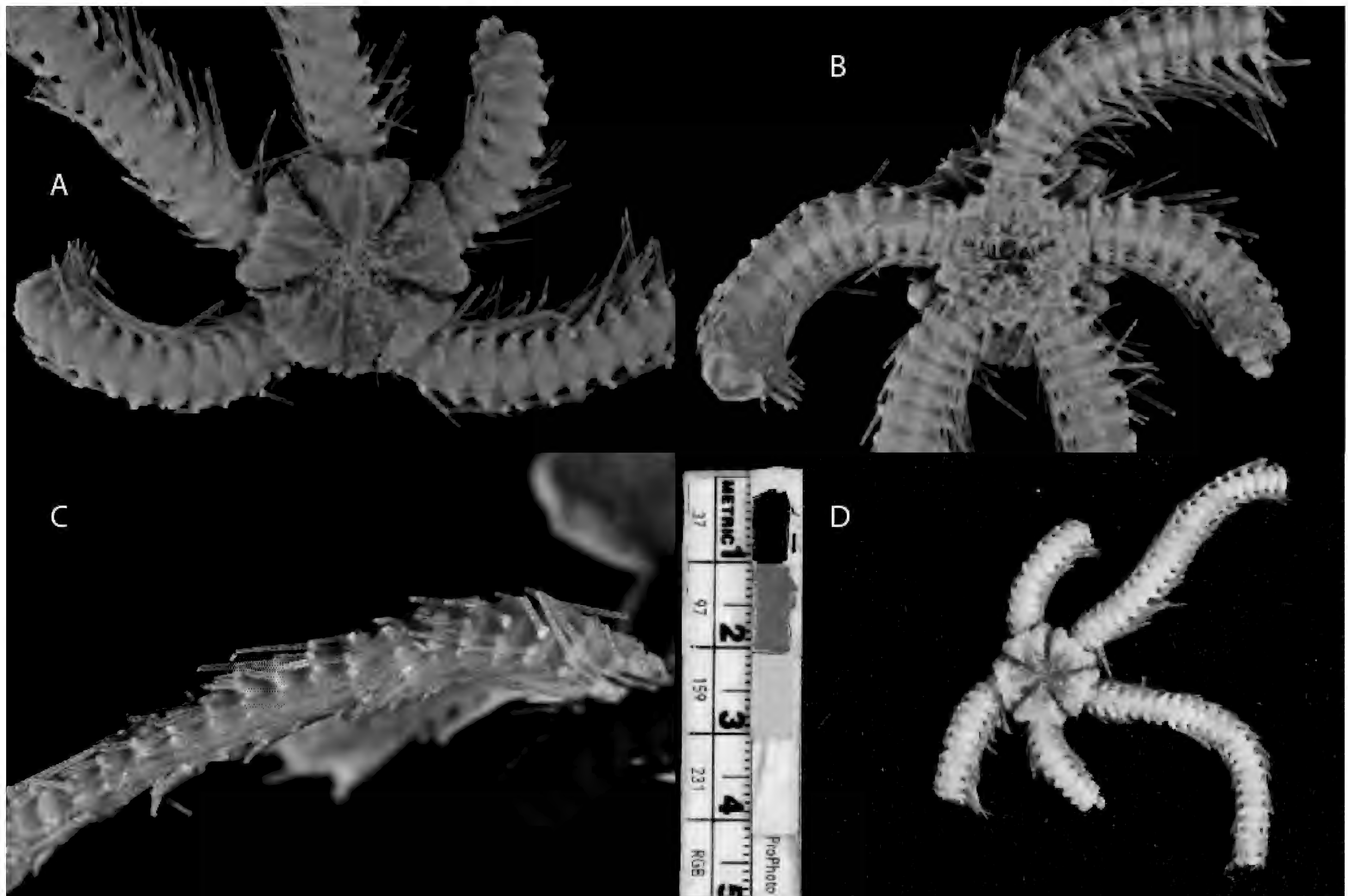
Ophioplinthaca semele AH Clark, 1949

Figure 51. *Ophioplinthaca semele*. (A-D) NMV F308036 (Op 126, 11.5 mm dd) preserved, (A) dorsal, (B) ventral, (C) lateral arm; (D) live colour.

Description of IOT material Disc to 11.5 mm, indented interradially to form wedge-like formations over the arm base; covered in coarse overlapping plates, larger abradially to radial shields; disc stumps conical to capitate, with a waisted pedicel and disc like base, thorns present on upper half of stump; radial shields contiguous for distal $\frac{1}{2}$ of plate; oral shields wider than long with thickened distal lobe; thick adoral shields; 4 spiniform lateral oral papillae; DAPs fan-shaped, separate, to 6 arm spines, uppermost smooth, longest to 4 segments in length, lower denticulate; 1 tentacle scale, conical with thorny tip, as long as the VAP.

Taxonomic remarks Differs from *O. globata* in having contiguous radial shields, conical to capitate disc stumps, and oral shields with a lobed distal margin. Its mitochondrial DNA clusters with *O. semele* specimens recorded by Chen *et al.* (2021) and Nethupul *et al.* (2022).

Distribution North-western Pacific Ocean from Guam to Hawaii (538–1251 m); IOT (643–1114 m).

Ecology and life history Epizoic, found to date only on seamounts.

Ophiosabine sp.MoV.7346

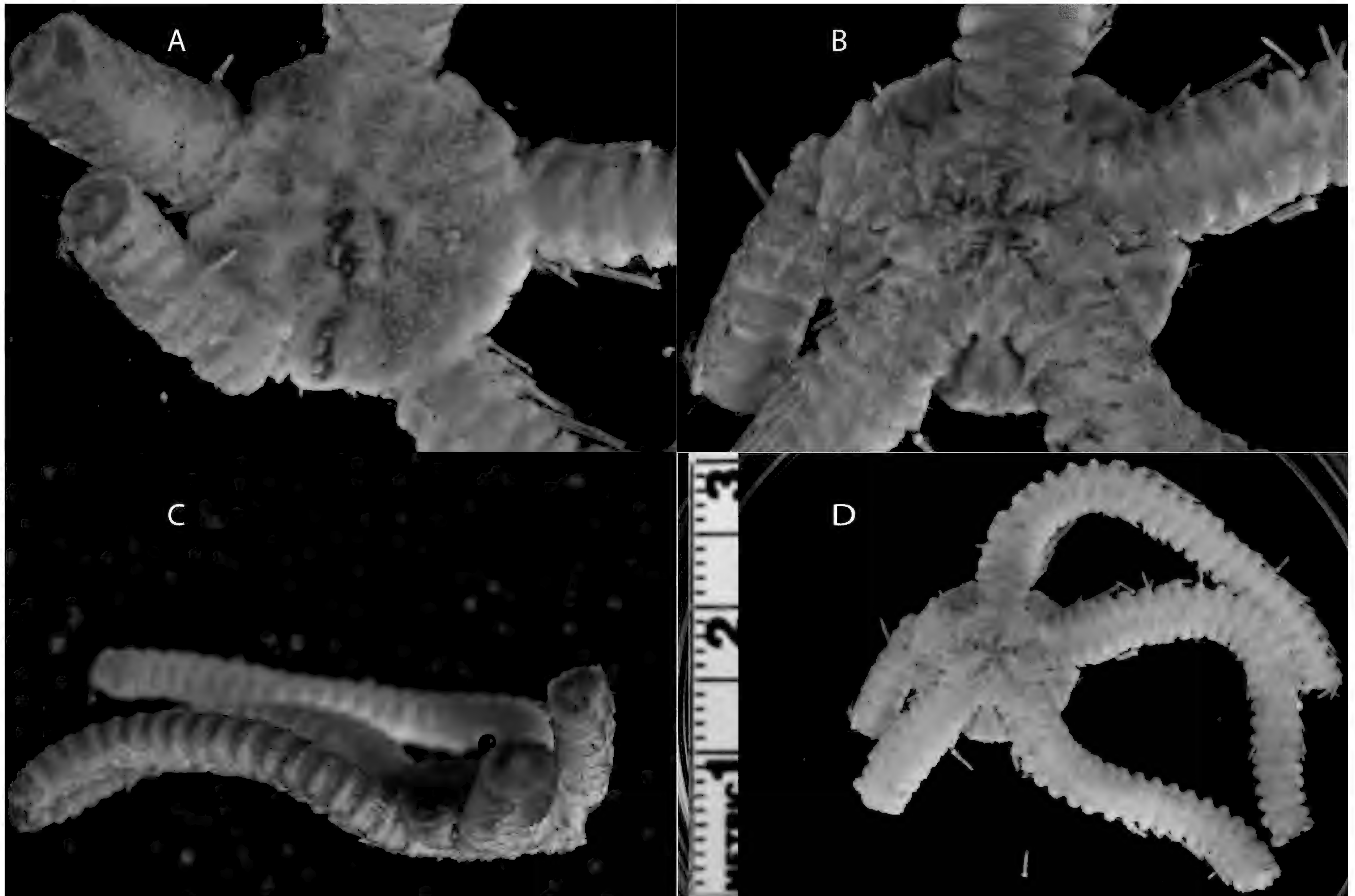


Figure 52. *Ophiosabine* sp.MoV.7346. (A-D) NMV F305556 (Op 16, 11 mm dd) dried, (A) dorsal, (B) ventral, (C) lateral arm; (D) whole body.

Description of IOT material Disc to 11 mm dd, circular margin, disc stumps sparse, with a waisted stalk and an expanded crown of thorns; oral shield longer than wide, trapezoid-shape with proximal margin wider than distal one; adoral shields positioned proximal to oral shields, thickened and quadrangular; 3-4 oral papillae, outer ones widened; DAPs fan-shaped, contiguous near arm base; to 9 arm spines, microscopically thorny, cylindrical, tapering to a blunt point, upper longest to at least 4 segs (most spines are broken); 1 tentacle scale, flat and bluntly rounded at tip, 2.5x as long as wide, almost the length of the VAP.

Taxonomic remarks There are several 5-armed *Ophiosabine* species that have been referred to *O. 'rosea'* from around the Southern Ocean, Australia and into the Pacific (O'Hara *et al.*, 2013). DNA evidence (unpublished) show that this specimen is a distinct tropical Indo-Pacific clade. More work is needed to morphologically distinguish these lineages. Specimens of *O. 'rosea'* recorded from Japan are likely to be mis-identified *O. acanthinotata*.

Distribution IOT (781–1114 m).

Family Ophiobyrsideae

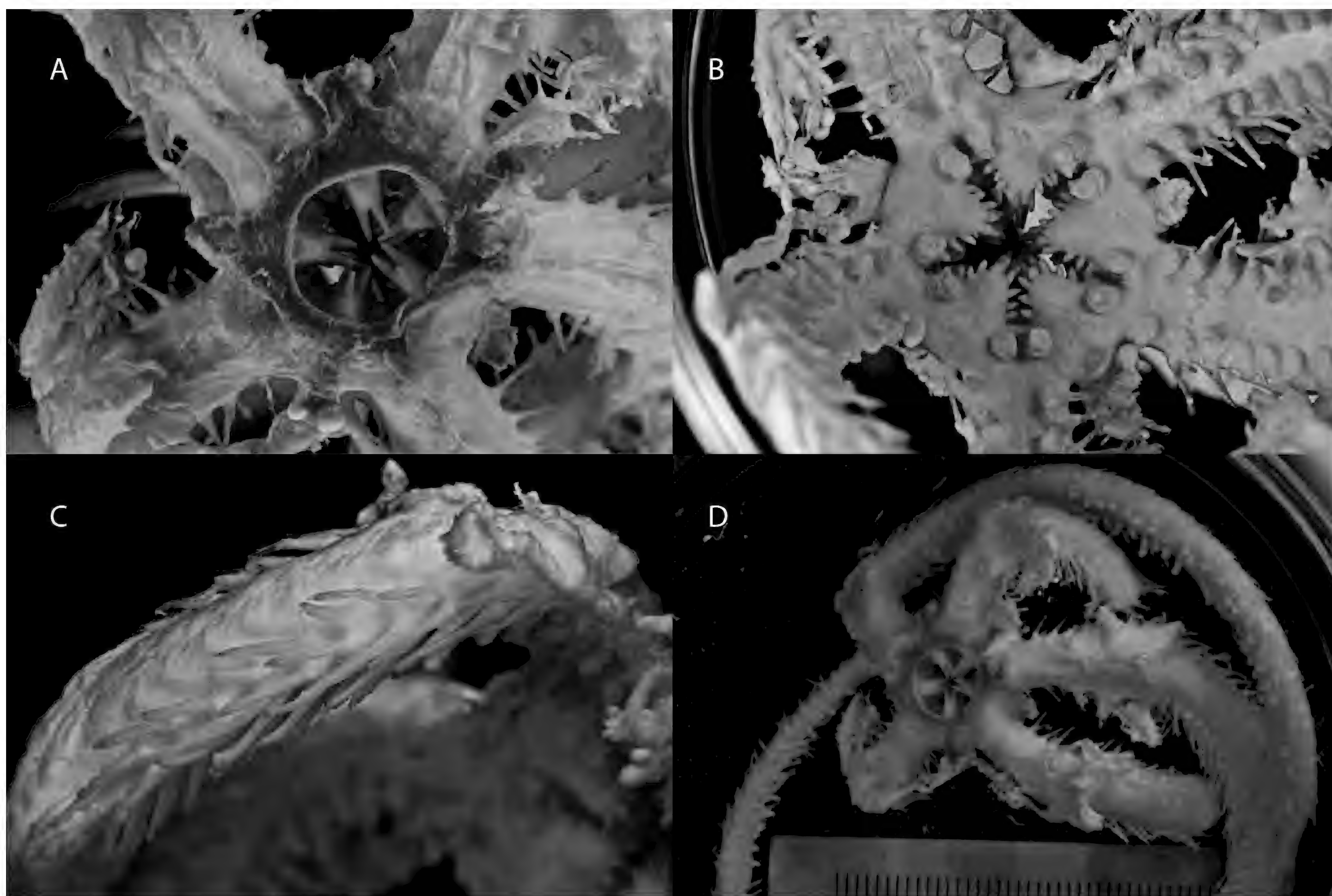
Ophiophrixus sp.MoV.7348

Figure 53. *Ophiophrixus* sp.MoV.7348. (A-D) NMV F308342 (Op 163, 35 mm dd) dried, (A) dorsal, (B) ventral, (C) lateral arm; (D) whole body.

Description of IOT material Disc to 35 mm dd, dorsal disc mostly torn off but can see 1-2 rows of short conical spines on two radial shields; arms long and robust; no DAPs, VAPs pentagonal with proximal angle, separated by a thin flange of the LAP; 4 arm spines, long, thin and tapering to fine point, covered in skin, slightly denticulate at tip, to 2 segments in length, becoming more denticulate distally, particularly along the ventral surface, but not hook-like; 3-4 lateral oral papillae, 3 dental papillae at jaw apex and teeth in 2 rows, covered in thick skin; large tentacle pores without scales; live colour brown-yellowish arms, darker tube feet.

Taxonomic remarks Without a dorsal disc, it is difficult to assign this specimen to a genus. It has the long arm spines, which are not modified distally into strong hooks, and the numerous (>3) lateral oral papillae of *Ophiophrixus* but doesn't have the single row of tall spines along the radial shield of that genus.

Distribution IOT (527–528 m).

Ecology and life history The species may be the same as the large orange brittle-stars observable on video of the on soft sediment near the Muirfield seamount summit.

Family Ophiodermatidae

Bathypectinura heros (Lyman, 1879)

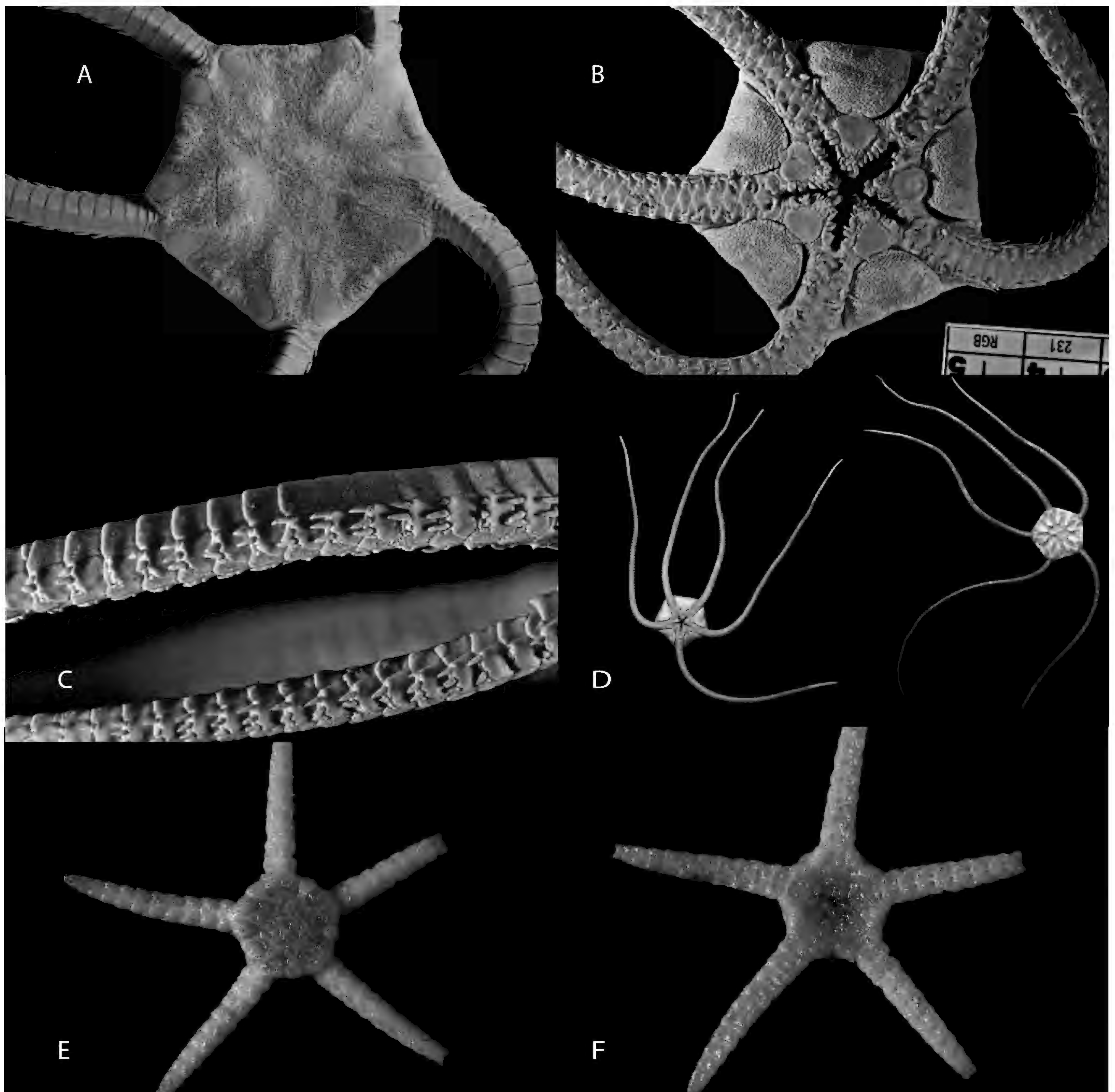


Figure 54. *Bathypectinura heros*. (A-C) NMV F305610 (Op 31) dried, (A) dorsal, (B) ventral, (C) arm. (D) NMV F308023 (Op 113) live colour. (E-F) NMV 308025 (Op 116) juvenile live colour, (E) dorsal, (F) ventral.

Description of IOT material Disc to 45 mm dd. Very long flexible arms. Disc granulated on adults, except radial shields naked, 10 oral papillae along each jaw side, the inner pointed, the outer 3 (oral tentacle scales) rounded and scale-like, dorsal arm plates trapezoid, broadly contiguous, one large circular tentacle scale (can be 2 on basal pores), typically 3 arm spines. Juveniles with fewer (or no) granules, relatively large

radial shields, 5 oral papillae, expanded first lateral arm plates, and 1-2 arm spines.

Taxonomic remarks *Bathypectinura heros* is currently recognised as a single (but polymorphic) tropical-temperate bathyal species (Madsen, 1973). Juveniles (5-13 mm dd) of *Bathypectinura* differ from adults in having expanded first lateral arm plates, triangular separate dorsal arm plates, and few or no disc granules,

and were previously misidentified as a separate genus, *Ophiocrates* (see Madsen, 1973). But species in two more genera (*Ophiomidas* and *Ophiuraster*) also appear very similar to *Bathypectinura* juveniles. *Ophiomidas aureum* from 675 m off New Zealand, is known from the unique 4.5 mm type, and is a probable synonym of *B. heros*. It represents the juvenile stage with few disc granules and the expanded first lateral arm plates have just separated distal to the oral shields. Other *Ophiomidas* species are also very similar and likely to be *Bathypectinura* juveniles also. *Ophiuraster* species appear to represent the post-larval stage, with 7-10 arm segments. The first lateral arm plates are contiguous distal to the small oral shields, the central disc is covered with small imbricating plates, and there are 1-2 arm spines. *Ophiuraster perissus* (4 mm dd, 2312 m, Gulf of Aden) is an early stage with 7 arm segments, the radial shields are contiguous, and only one oral tentacle scale protects the exposed 2nd oral tentacle pore. *Ophiuraster symmetricus* (4 mm dd, 760 m off New Zealand) is a slightly later stage with 10 arm segments, a small marginal interradi-plate separating the radial shields, the first lateral arm plates have started to separate distally, and there are up to 3 oral tentacle scales. But there are some characters that may reflect morphological differentiation rather than ontology. The expanded first lateral arm plates can easily be seen from the dorsal view on *O. symmetricus* (<https://collections.tepapa.govt.nz/object/1339005>) but are totally hidden by the thick dorsal disc on *O. perissus*. The radial shields are different shapes, tumid, granulated and broadly contiguous (forming a rim) on *O. perissus*, and flattened, oblong, obliquely positioned and widely separated interradi-

ally on *O. symmetricus*. The central disc plates and small and numerous on *O. perissus* and fewer and less overlapping on *O. symmetricus*. Here we also illustrate a 4.5 mm dd 'Ophiuraster' specimen from the IOT with 14 arm segments (fig. E-F). It is similar to the *O. perissus* type in having a high thick disc, numerous central plates, and the first expanded lateral arm plates cannot be seen from the dorsal view. There are 3 arm spines, and a large marginal plate separates the radial shield. Whereas *O. aureum* appears to represent the next stage in the ontology of *O. symmetricus*. According to their type localities and depth, *O. perissus* is likely to be the post-larva of *B. heros*, and *O. symmetricus* the post-larvae (and *Ophiomidas aureum* the juvenile) of *B. conspicua*. The other species referred to *Ophiuraster*, *O. belyaevi* and *O. patersoni* are post-larvae of *Asteronyx* species (Stöhr, 2005). Specimens referred to *O. symmetricus* from SE Australia (https://researchdata.museum.vic.gov.au/brittlestar/www/o_symm.htm) are similar to *O. patersoni*, lacking dorsal arm plates and oral shields, with hook-shaped arm spines, and thus appear to be juvenile *Asteronyx loveni*.

Distribution Atlantic, Indian and West Pacific Oceans (not Eastern Pacific), tropical to temperate, 200–3000 m, although shallower specimens from 200-1000 m appear to represent separate species, see above, IOT specimens 1913–2264 m.

Ecology and life history Ophiidermatids are typically carnivores and actively hunt or scavenge. *Bathypectinura* specimens from the Caribbean Sea can swim if disturbed (Hendler & Miller, 1991).

Family Ophiopezidae

Ophiopeza spinosa (Ljungman, 1867)

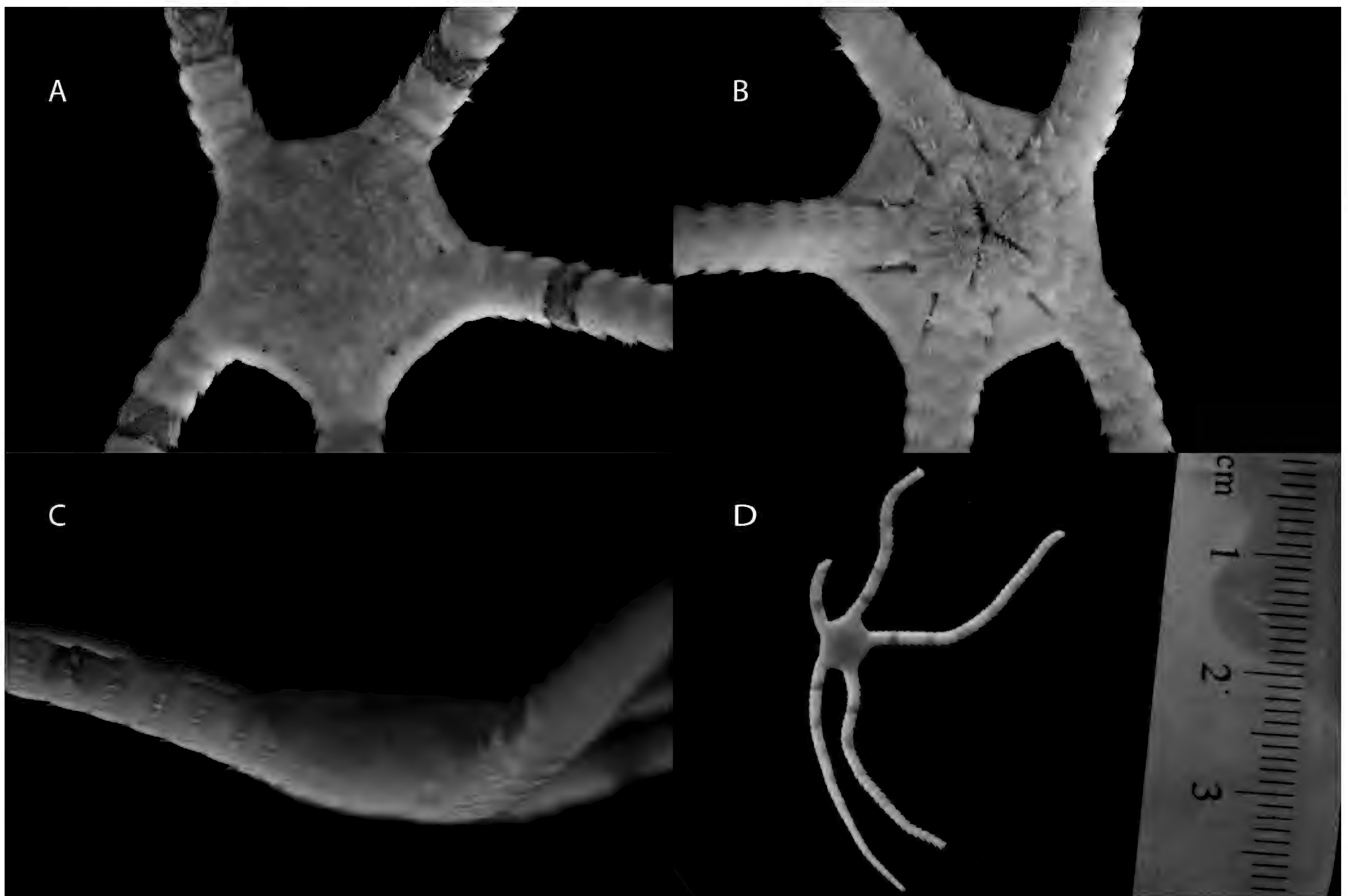


Figure 55. *Ophiopeza spinosa*. (A-D) NMV F308121 (Op 179, 5.5 mm dd) preserved, (A) dorsal, (B) ventral, (C) arm, (D) whole body.

Description of IOT material Disc to 5.5 mm dd, pentagonal in outline; tumid disc plates covered in small polygonal granules across the dorsal and ventral surfaces, as well as the distal end of the adoral plates and the oral plates (but not the oral shields); radial shields hidden by granules, 2x as long as wide, separated by 3 disc plates; oral shield broadly triangular with a supplementary oral shield along the distal margin; DAPs fan-shaped contiguous; to 7 pointed arm spines, lowermost longest, to 1/3 segment in length; 2 oval tentacle scales, arms with thin dark bands every 4-5 segments.

Taxonomic remarks *Ophiochaeta hirsuta*, which has ven-

tral granules elongated into short spines, falls within the *O. spinosa* complex. Western Indian Ocean records need to be checked to see if they are the related *O. fallax*.

Distribution Tropical Indo-West Pacific (0–183 m); IOT (111–121 m).

Ecology and life history *Ophiopeza spinosa* broods its larvae internally in the respiratory bursal sacs and it is a hermaphrodite that gradually changes from being male to female with size (Byrne *et al.*, 2008). It lives under coral and rock debris.

Family Ophiotomidae

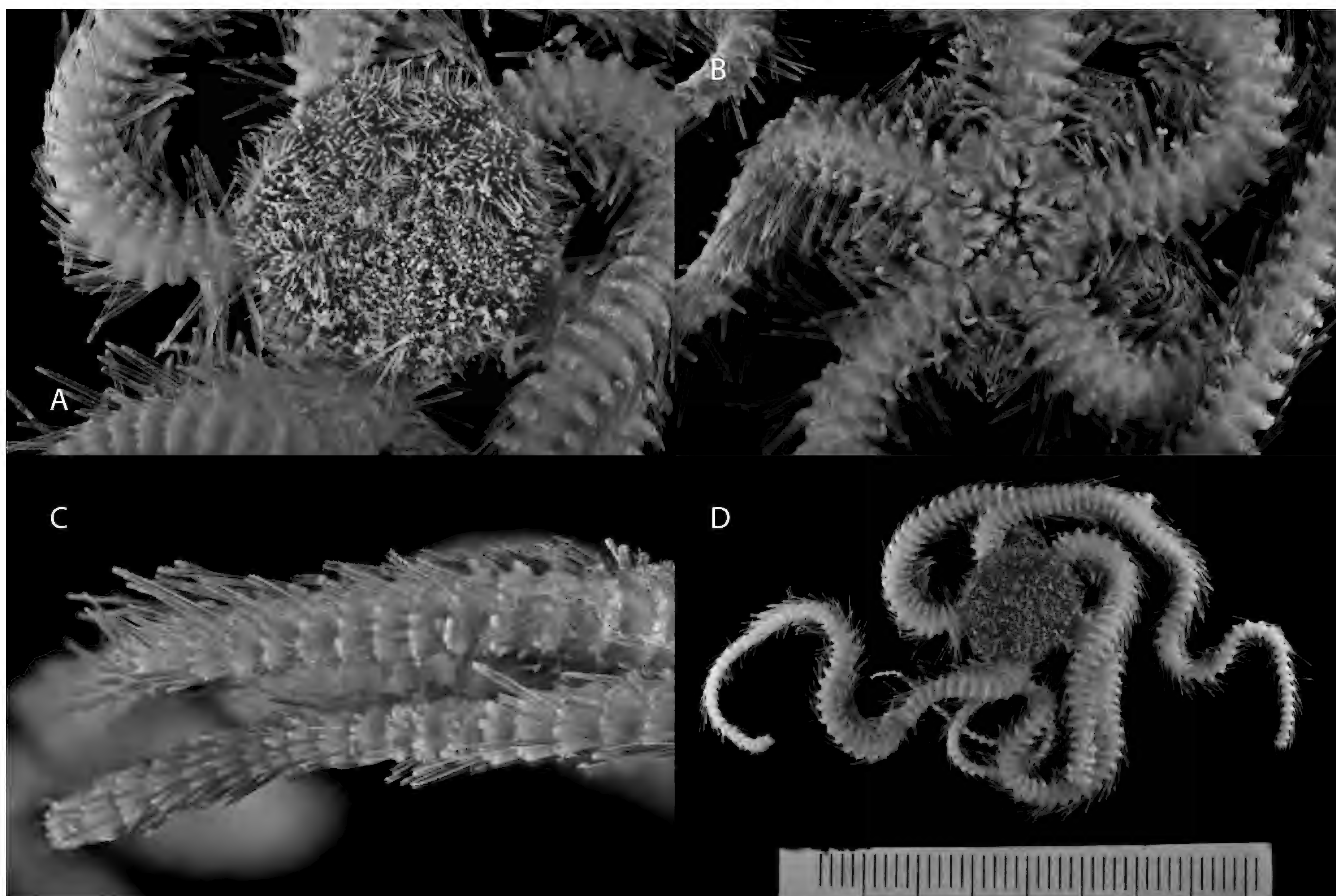
Ophiopristis procera (Koehler, 1904)

Figure 56. *Ophiopristis procera*. (A-D) NMV F308101 (Op 163, 13 mm dd) preserved, (A) dorsal, (B) ventral, (C) arm, (D) whole body.

Description of IOT material Disc to 13 mm dd, round margin; covered in tall (>1mm) slender spines with a thorny tip, some adpressed thorns along the spine shaft as well; oral shield as wide as long, with a lobed outer margin and an obtuse proximal angle, a prominent row of spines along distal margin of the oral shields; 2-3 dental papillae at jaw apex, with 4-5 small conical ones on either side, 2 larger ones around 2nd oral tentacle pore; DAPs with a series of simple to forked spines along the distal border; to 8 arm spines, flattened with denticulate margins, thorns of 2 sizes, some larger and other smaller ones, upper arm spines to >4 segments in

length; one rounded thin tentacle scale, two on basal segments.

Taxonomic remarks This species has been assigned to *O. procera* based on the thorn-tipped disc spines, denticulate arm spines, and the row of oral shield spines. However, the distinction between this species and other species such as *O. luctosa* is slight and requires more samples to resolve.

Distribution Eastern Indonesia, Papua New Guinea and the SW Pacific (198–760 m); IOT (527–528 m).

Ecology and life history Epizoic.

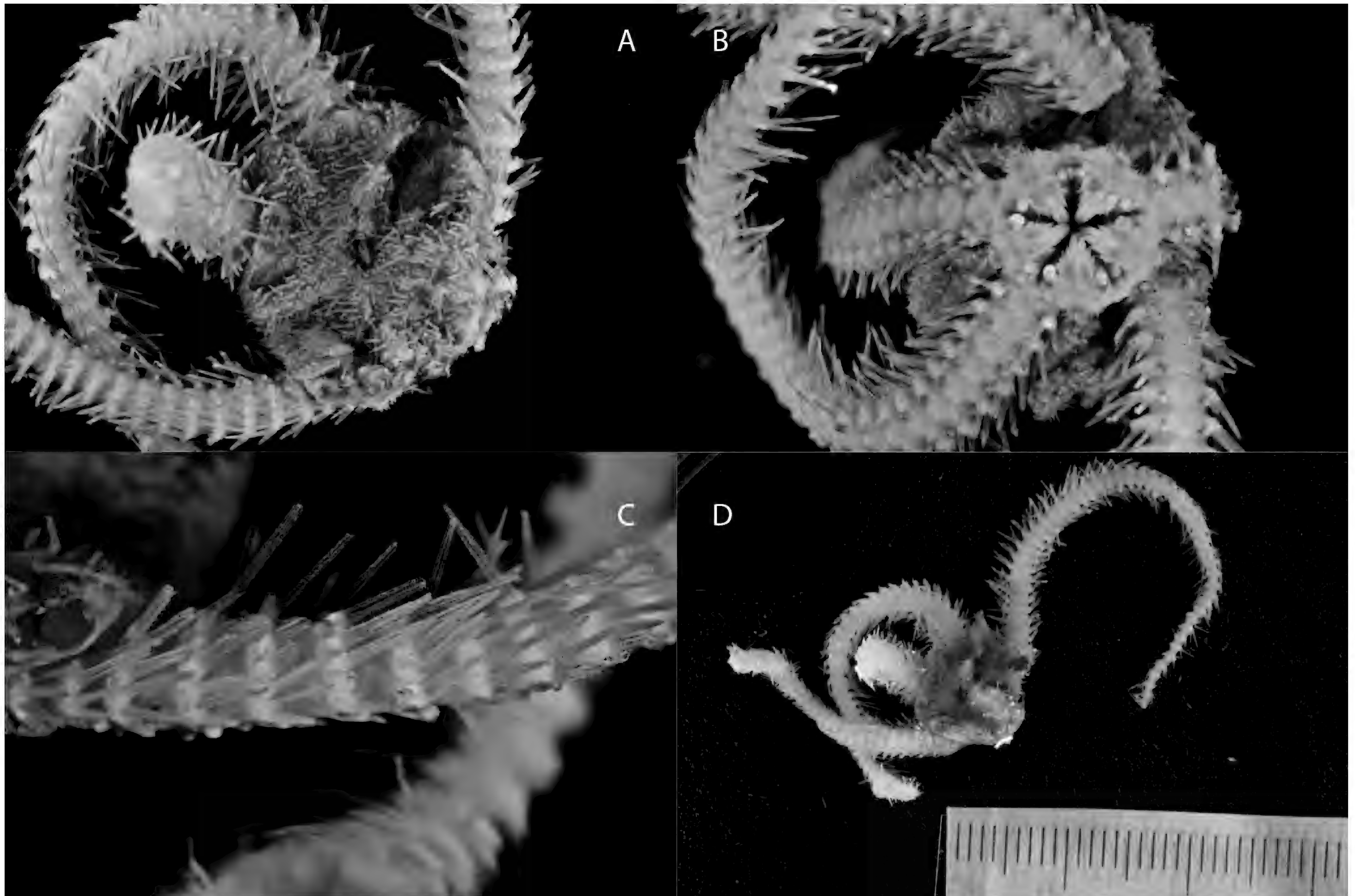


Figure 57. *Ophiopristis shenhaiyongshii*. (A-D) NMV F308056 (Op 141, 10 mm dd) preserved, (A) dorsal, (B) ventral, (C) arm, (D) whole body.

Description of IOT material Disc to 10 mm dd, bearing a mixture of small (height=width) and tall (7x width) conical spines, the longer spines having a few thorns at the tip; radial shields only exposed at the distal edge; oral shields oval 2x as wide as long, with a series of small conical disc spines along the distal margin; adoral shields thick, 2 x wide as high, overlapping the lateral angle of the oral shields; 2 teeth papillae at jaw apex, 3 spiniform lateral oral papillae, and 3 rounded scale-like papillae around the 2nd oral tube foot; DAPs triangular with an uplifted glassy denticulate margin, just contiguous; to 6 arm spines, flattened, with sparse

thorns on either side, becoming more pronounced on ventral side of lowest spines; one large rounded tentacle scale.

Taxonomic remarks This mtDNA COI of this specimen (unpublished) is very similar to that of the newly described *O. shenhaiyongshii* of the South China Sea. The disc and DAP spines are similar to *Ophiotreta matura*, but that species lacks the row of spines along the distal edge of the oral shields.

Distribution South China Sea (1360 m); IOT (1110–1139 m).

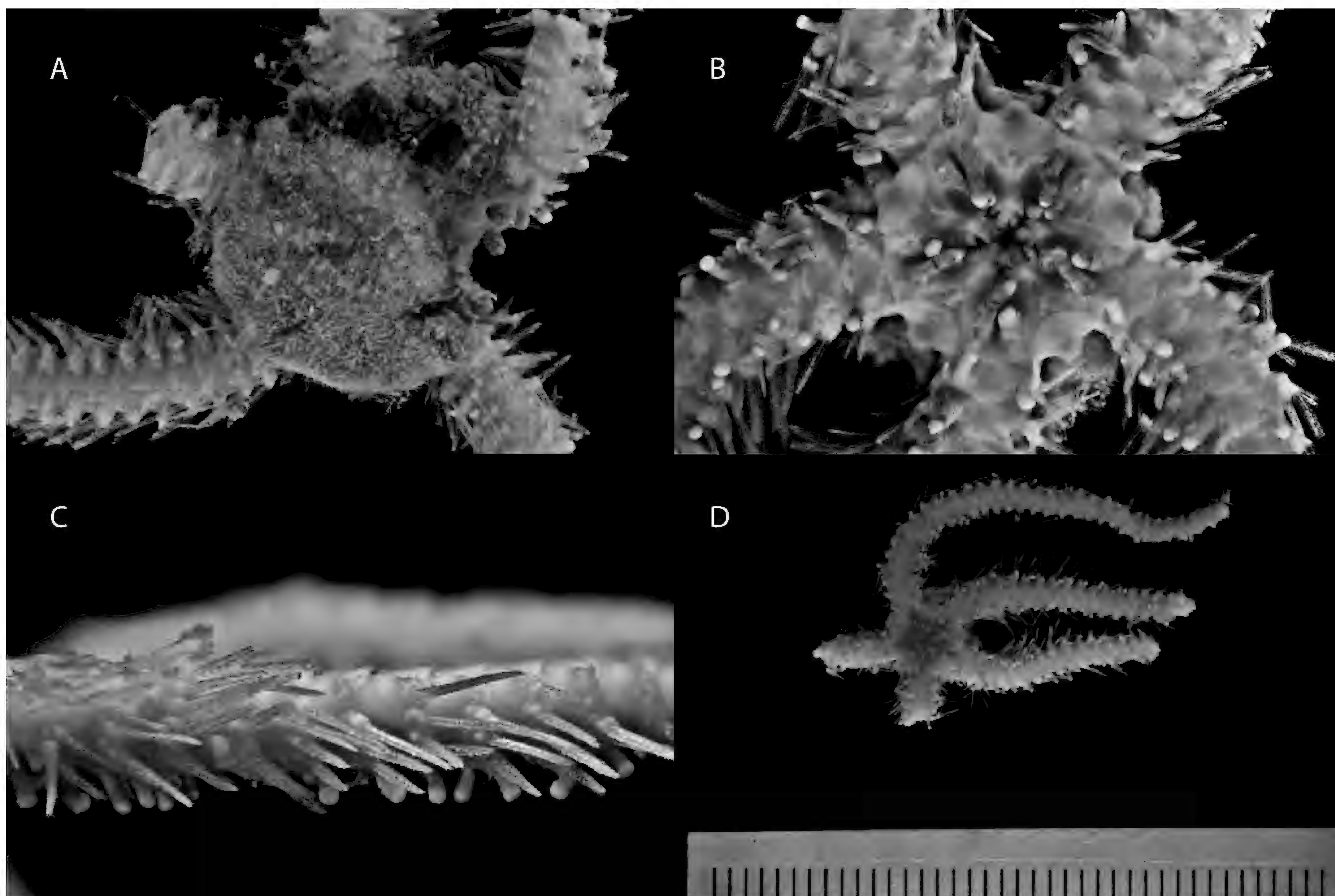
Ophiopristis vestita (Koehler, 1897)

Figure 58. *Ophiopristis vestita*. (A-D) NMV F308087 (Op 161, 7 mm dd) preserved, (A) dorsal (disc torn on right side), (B) ventral, (C) arm, (D) whole body.

Description of IOT material Disc to 7 mm dd, covered in long needle-like spinelets with a pointed tip, rare thorns along the shaft; oral shield axe-head shaped, with a prominent distal lobe and a convex proximal margin, wider than long, no spines along distal border; 1-2 apical dental papillae, 3-4 conical lateral oral papillae, and 2-3 small scale-like papillae around the second oral tube foot; DAPs without spines on the distal border; to 6 arm spines, flattened, with a hollow central core and two denticulate flanks, upper one to 3 segments in length, fine arm spine denticulations;

one oval flat thin tentacle scale, 2x longer than wide, a second thinner one present on basal segments, live colour: with brown markings on disc.

Taxonomic remarks These specimens are very similar to the lectotype of *O. vestita* (IM 4730/7) from the Andaman Islands (362-390 m) except this type has slightly more lanceolate tentacle scales and has a few thorns on the distal edge of the basal DAPs.

Distribution IOT (365–890 m).

Ophiotreta sp.MoV.7349

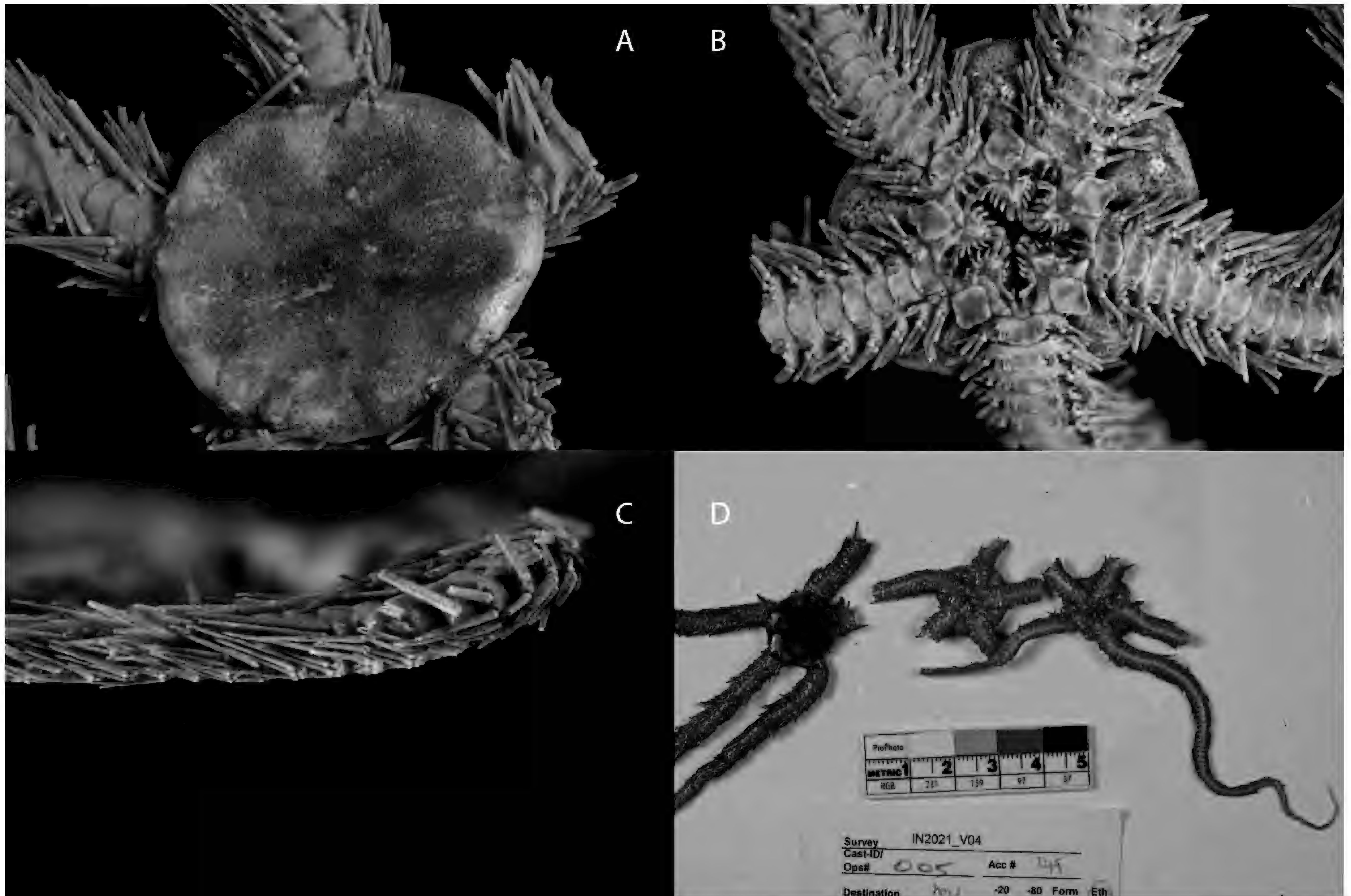


Figure 59. *Ophiotreta* sp.MoV.7349. (A-C) NMV F305613 (Op 5, 15 mm dd) preserved, (A) dorsal, (B) ventral, (C) arm; (D) NMV F305562 (Op 5, 17 mm dd) live colour.

Description of IOT material Disc to 17 mm dd, covered in small shiny overlapping plates bearing spherical hollow granules, minutely rugose; exposed section of the radial shields 2x as long as wide; oral shields longer than wide, lobed distally; 1-few apical papillae and 4-5 lateral oral papillae, the outer one spatulate; DAPs 2x as wide as long, fan-shaped with 1 or more small spine at the centre of the distal margin; to 7 arm spines, to 4 segments in length, upper flattened, hollow, subcylindrical in cross section; 2 oval tentacle scales; live colour:

dark brown.

Taxonomic remarks The IOT specimens are genetically distinct (unpublished) from other specimens of *O. valenciennesi* from the Indo-Pacific and appear to represent a new species. It is similar to *O. durbanensis* from South Africa which also has naked radial shields but lacks the disc spines (amongst the granules) of that species.

Distribution IOT (365–997 m).

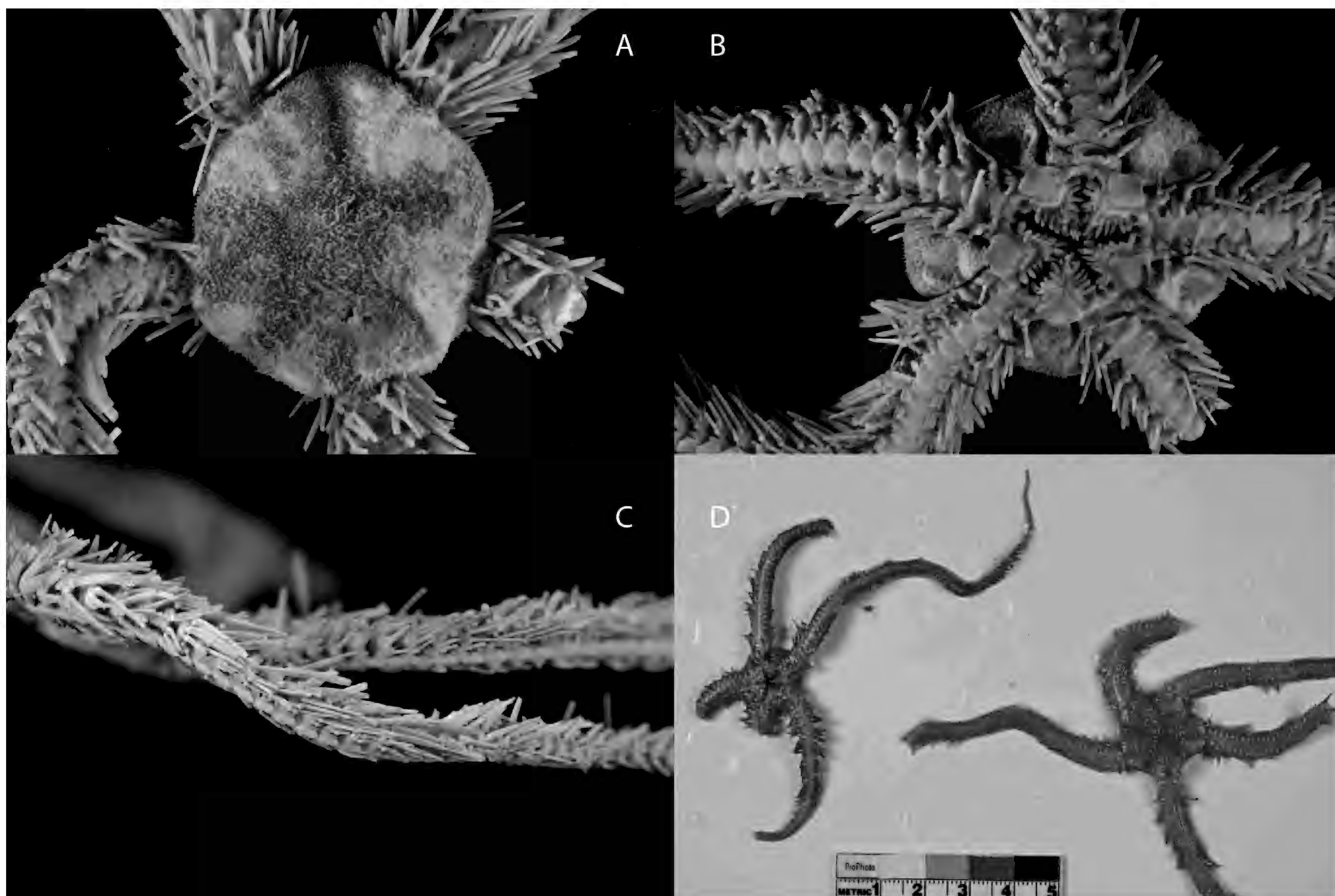
Ophiotreta stimulea (Lyman, 1878)

Figure 60. *Ophiotreta stimulea*. (A-C) NMV F305614 (Op 5, 16 mm dd) preserved, (A) dorsal, (B) ventral, (C) arm; (D) NMV F305584 (Op 5, 19 mm dd) live colour.

Description of IOT material Disc to 19 mm dd, covered in small overlapping plates bearing conical spines of varying heights (1-6x width) covered in small thorns over the whole length; only distal tip of radial shields exposed; oral shields arrow-head shaped, as long as wide with a rounded proximal angle and lobed distal margin; 1-3 tooth papillae at jaw apex, 5 lateral oral papillae, the outer two lengthened; DAPs, 2s as wide as long, broadly fan-shaped with a convex distal edge that bears a series of small conical spines, just in contact; to 8 arm spines, upper to 4 segments long, hollow, round

in cross-section, tapering to a blunt tip, rough surface but not thorny; 2 tentacle scales basally, reducing to one by mid-arm, spatulate, $\frac{3}{4}$ length of VAP; live colour: pink and grey.

Taxonomic remarks The conical disc spinelets of varying heights is a diagnostic character for this species.

Distribution Indo-West Pacific, from East Africa to French Polynesia, northern New Zealand to Southern Japan (30–2000 m); IOT (442–1139 m).

Ecology and life history Epizoic.

Ophiomedea sp.MoV.7350

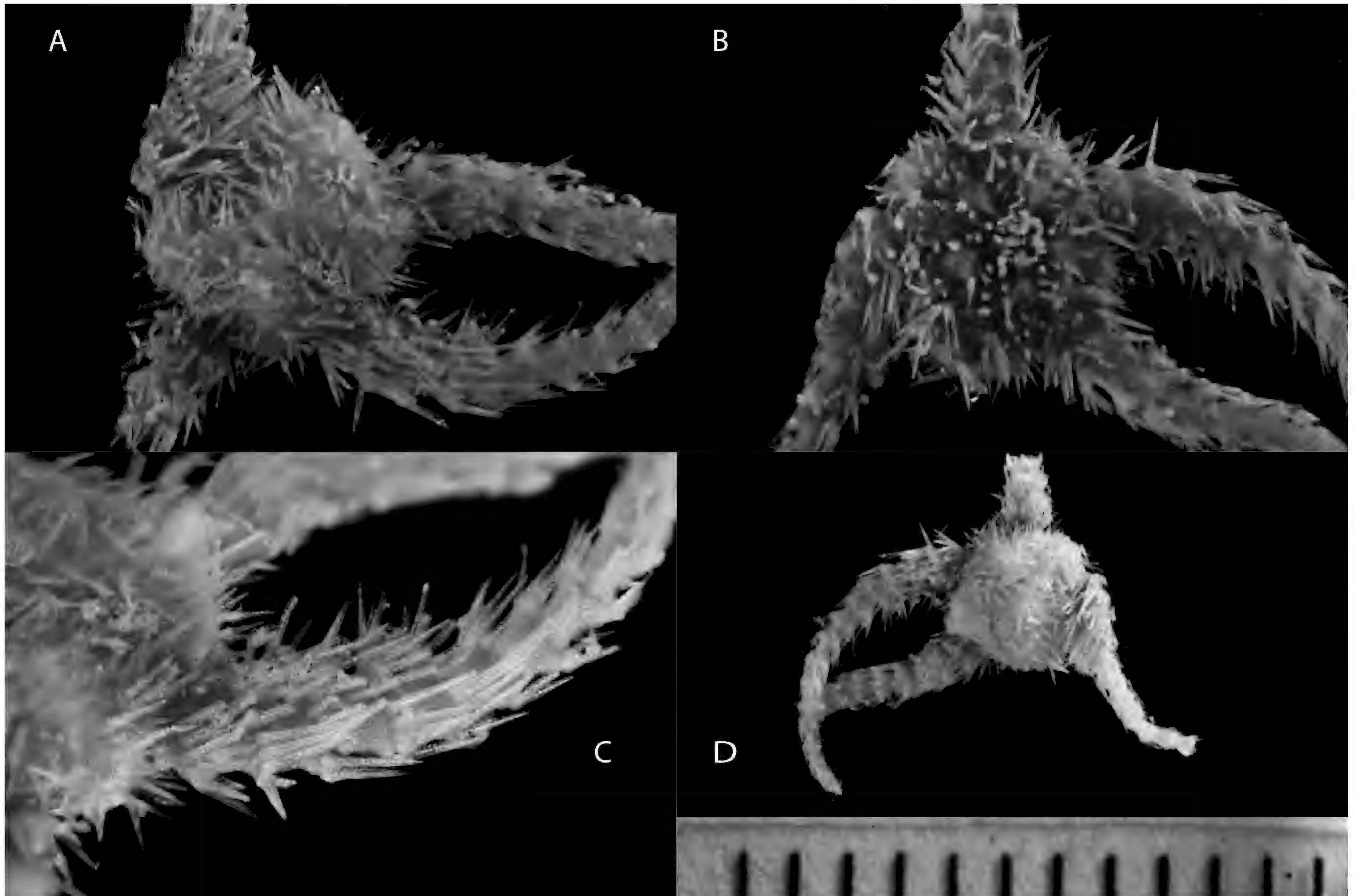


Figure 61. *Ophiomedea* sp.MoV.7350. (A-C) NMV F308072 (Op 147, 2.5 mm dd) preserved, (A) dorsal, (B) ventral, (C) arm; (D) whole body.

Description of IOT material Disc 2.5 mm dd, covered in thin overlapping disc plates obscuring the radial shields, disc spines 6x longer than wide, pointed, with thorns, rounded base; oral shields as long as wide, adoral shields very narrow proximally, expanding past the oral shields distally; tooth wide and bluntly pointed at tip of elongated jaw; 3 rounded lateral oral papillae and one spiniform adoral shield spine; arms short, 2x dd; DAPs small and fan-shaped, widely separated; LAPs with granular stereo structure; VAPs dumbbell-shaped, longer than wide, with concave edges around the large

tube feet, separate; to 6 arm spines, 1.5x segments long, subulate, pointed tip, microscopically thorny; one rod-like tentacle scale, almost the length of the VAP; colour: brownish.

Taxonomic remarks This specimen differs from the other known species of *Ophiomedea*, *O. duplicata*, in having a more rounded oral shield and thinner adoral shields. But this genus is known from very few specimens.

Distribution IOT (2617–2721 m).

Family Ophiernidae

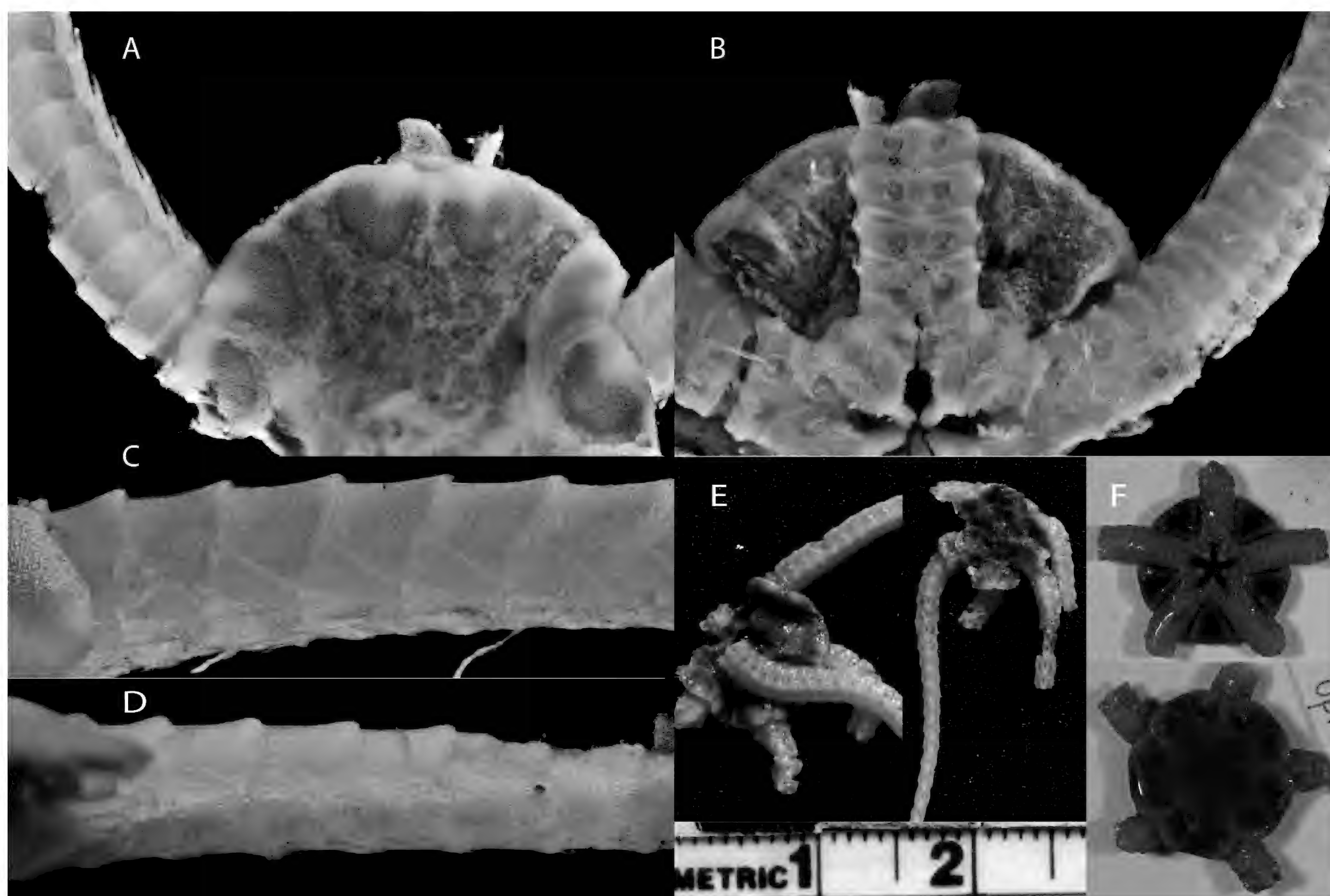
Ophiernus adpersus Lyman, 1883

Figure 62. *Ophiernus adpersus*. (A-D) NMV F307640 (Op 131, 9 mm dd) preserved, (A) dorsal, (B) ventral, (C-D) arm, (E) live colour, (F) NMV F307659 (Op 195, 20.5 mm dd) live colour.

Description of IOT material Disc to 20.5 mm dd, rounded margin, both sides of disc covered in small overlapping plates with scattered small granules; radial shields 1.6x dd, rounded triangular with a truncate distal edge and a convex proximal one, separate; oral shields spear-head shaped with distal lobe and acute proximal angle; numerous small pointed lateral oral papillae; DAPs broadly quadrangular, 2x wide as long, distal edge uplifted; arm widened at base so LAPs wider than VAPs on ventral surface; 2, rarely 3, pointed arm spines, upper to 0.8 segment in length, plus 10+ long bristle-like spines present on each lateral arm plate dorsal to the usual spines; two small tentacle scales that

do not cover the large pore.

Taxonomic remarks There is some genetic structure within samples previously identified as *O. adpersus*, suggestive of the presence of cryptic species (Christodoulou *et al.*, 2019).

Distribution Tropical Indo-West Pacific, from the Red Sea to Fiji, southern Japan to eastern Australia, West Atlantic (250–2600 m); IOT (1450–1426 m).

Ecology and life history The bristle-like spines have been observed to assist the animal to swim (Hendler & Miller, 1991).

Ophiernus vallincola Lyman, 1878

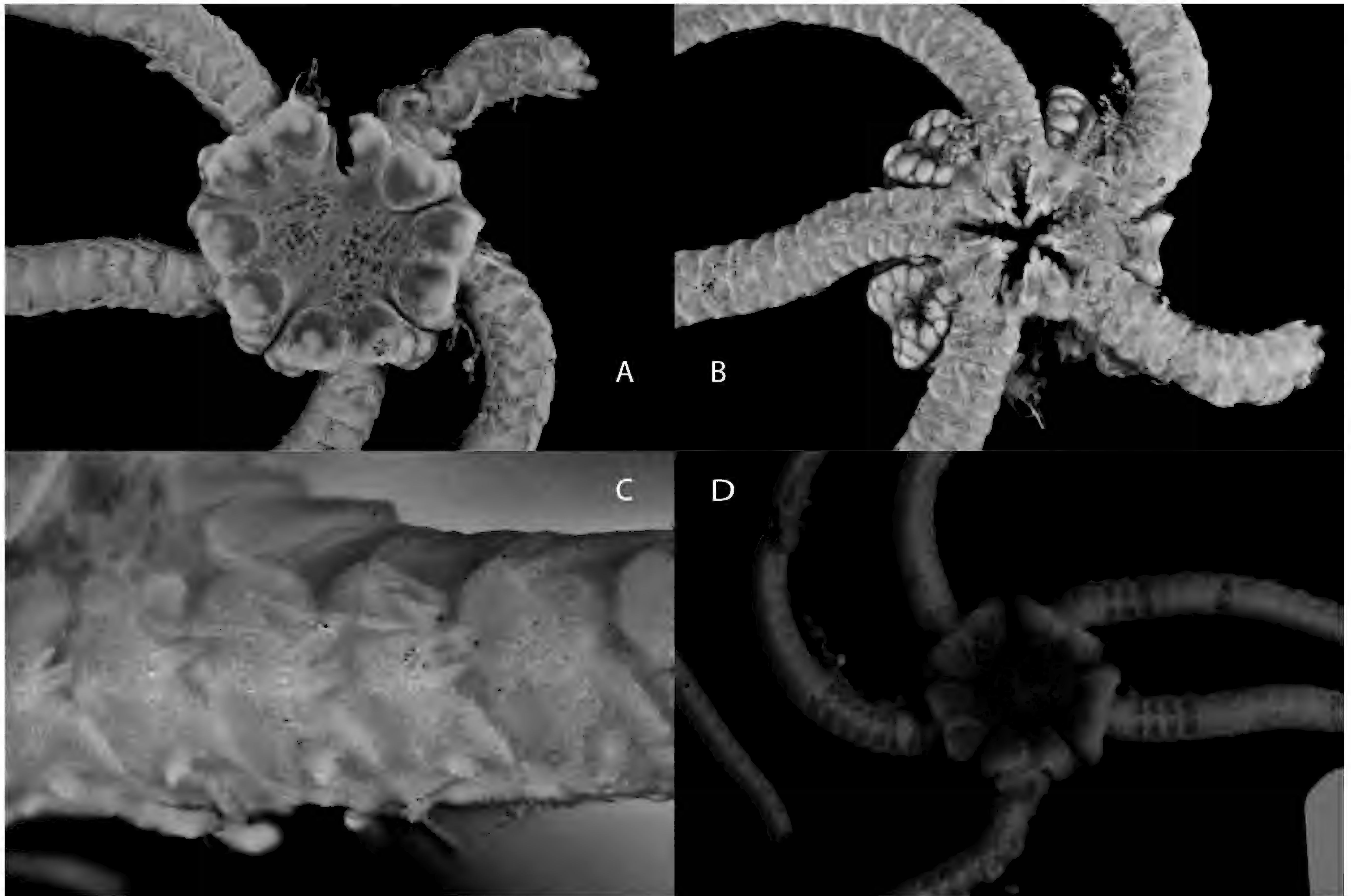


Figure 63. *Ophiernus vallincola*. (A-D) NMV F307644 (Op 145, 13 mm dd) preserved, (A) dorsal, (B) ventral, (C) arm, (D) live colour.

Description of IOT material Disc to 13 mm dd, covered in thick skin with observable plates only occurring around the radial shields and ventrally; small scattered granules present on disc plates; oral shields wider than long, with a convex to very slightly lobed distal margin; up to 7 small scale-like lateral oral papillae; DAPs trapezoid-shaped, contiguous; LAPs wider than VAPs on ventral arm; 2 (rarely 3-4) small arm spines, less than 0.5x the segment in length; 2 small tentacle scales.

Taxonomic remarks Upper bathyal west African specimens are generally called *Ophiernus alepidotus* (and

lacking disc scales except ventrally along the genital slit) and those from the eastern Pacific (which lack bristle-arm spines) *O. seminudus*. More research is required to test whether *O. vallincola* really has such an extensive bathymetric and geographic distribution. The *Ophiernus adspersus* complex differs in having plates and granules that cover most of the disc.

Distribution NE Atlantic, Indian, SW Pacific and Southern Oceans (400–4000 m); IOT (3078–3002 m).

Family Ophioleucidae

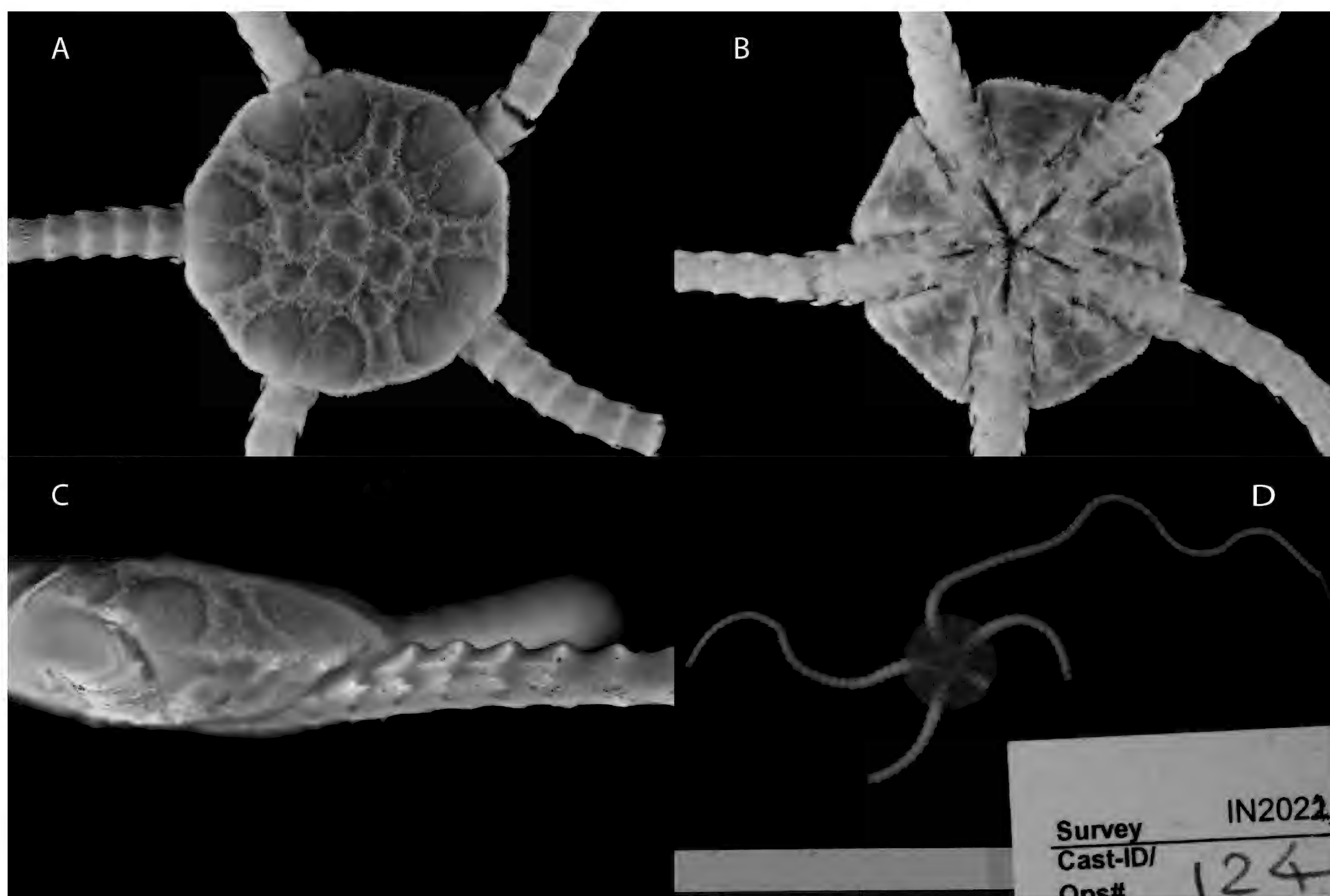
Ophioleuce brevispinum (H.L. Clark, 1911)

Figure 64. *Ophioleuce brevispinum*. (A-C) NMV F308061 (Op 143, 7 mm dd) preserved, (A) dorsal, (B) ventral, (C) arm. (D) NMV F 308035 (Op 124, 8 mm dd) whole body, live colour.

Description of IOT material Disc to 8 mm dd, covered in large plates, of which the primaries and interradial series are largest, tiny granules occur around the dorsal plates and elongated granules along the disc margin; radial shields $\frac{1}{2}$ dd, rounded, slightly longer than wide, contiguous for distal $\frac{2}{3}$; ventral surface flattened, no granules; 3 dental papillae at jaw apex, 4-5 quadrangular lateral oral papillae and one widened flap-like papillae distally protecting the 2nd oral tentacle; very long arms; DAPs trapezoid slightly wider than long, with protuberant distal edge, contiguous; VAPs contiguous until the edge of the disc, then becoming separate; 2 short arm spines near the ventral surface,

lowest longest, to $\frac{1}{3}$ segment in length; several tentacle scales on basal pores, outer one elongated; live colour: disc and dorsal base of arm reddish, otherwise pale.

Taxonomic remarks The mid-bathyal species *O. gracilis* is similar but can be distinguished by having contiguous VAPs along most of the arm, smaller radial shields, and small distal oral papillae.

Distribution East Indo-West Pacific, from the IOT to Desventuradas Islands Chile, southern Japan to northern New Zealand (211–1930 m); IOT(967–1343 m).

Ecology and life history Soft sediment dweller.

Order Amphilepidida

Family Amphiuridae

Amphioplus (Lymanella) cf. integer (Ljungman, 1867)

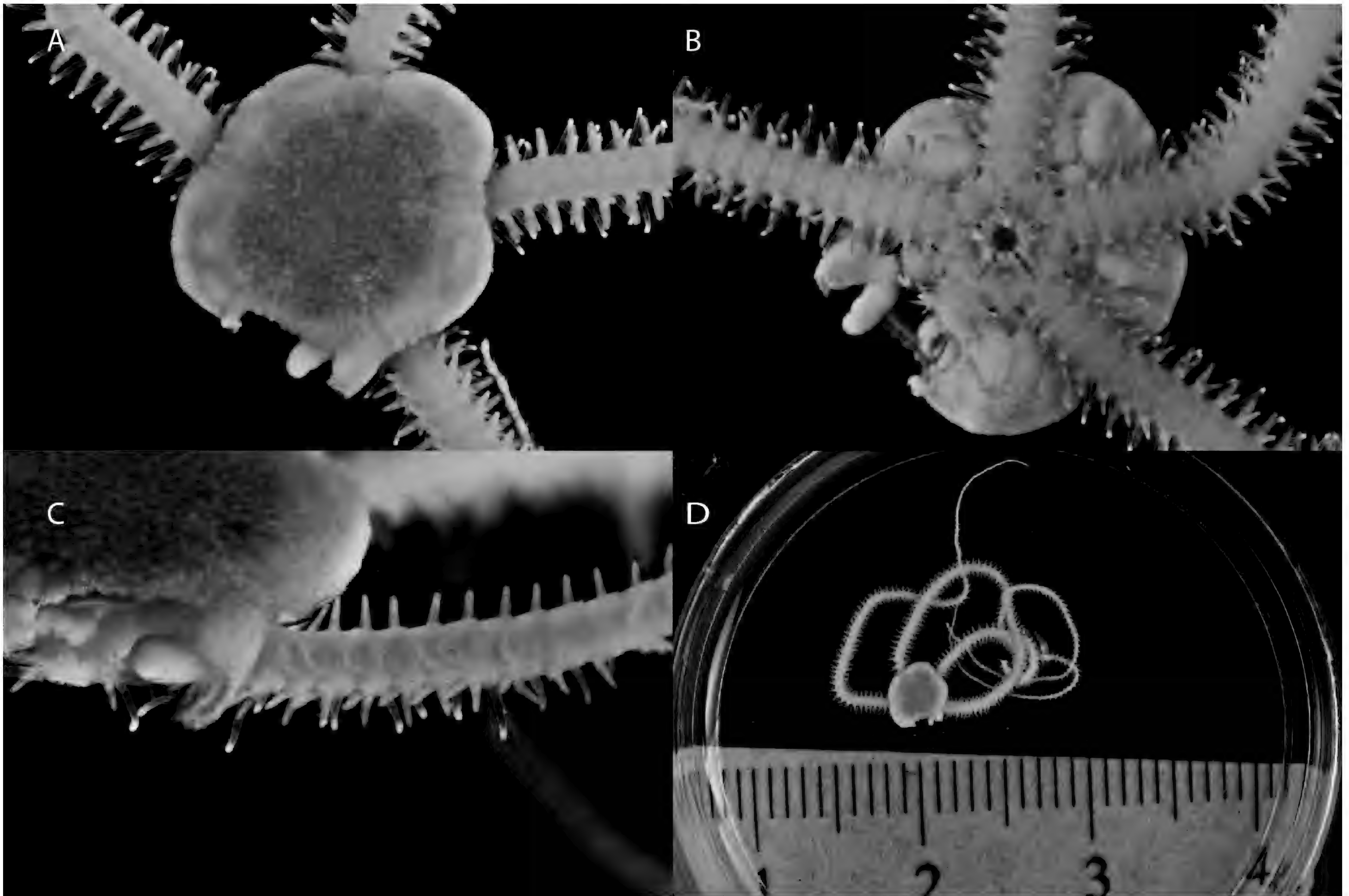


Figure 65. *Amphioplus (Lymanella) cf. integer*. (A-C) NMV F307656 (Op 172, 3.5 mm dd) preserved, disc torn on lower left (A) dorsal, (B) ventral, (C) arm. (D) live colour.

Description of IOT material Disc 3.5 mm dd, covered in overlapping plates, primaries not obvious, margin of disc dorso-ventrally rounded, no spinous processes; radial shields 3x length over width, 1/6 dd, proximal half divergent; ventral disc scaled; oral shield spear-head shaped, adoral shields meet interradially; 3 distal orals, middle one larger; arms >7x dd; DAPs 2x wider than long, distal edge slightly convex, not produced centrally; VAPs 2x longer than wide, separate; 3 arm

spines, middle one longest and thickest, 1.5x segment in length, slightly bent backward after mid arm; 2 tentacle scales, initially subequal but VAP scale becoming longer distally.

Taxonomic remarks This specimen has slightly narrower radial shields than the typical Indo-Pacific species *A. depressus*, which also has a sharp edge to the disc.

Distribution IOT (176–169 m).

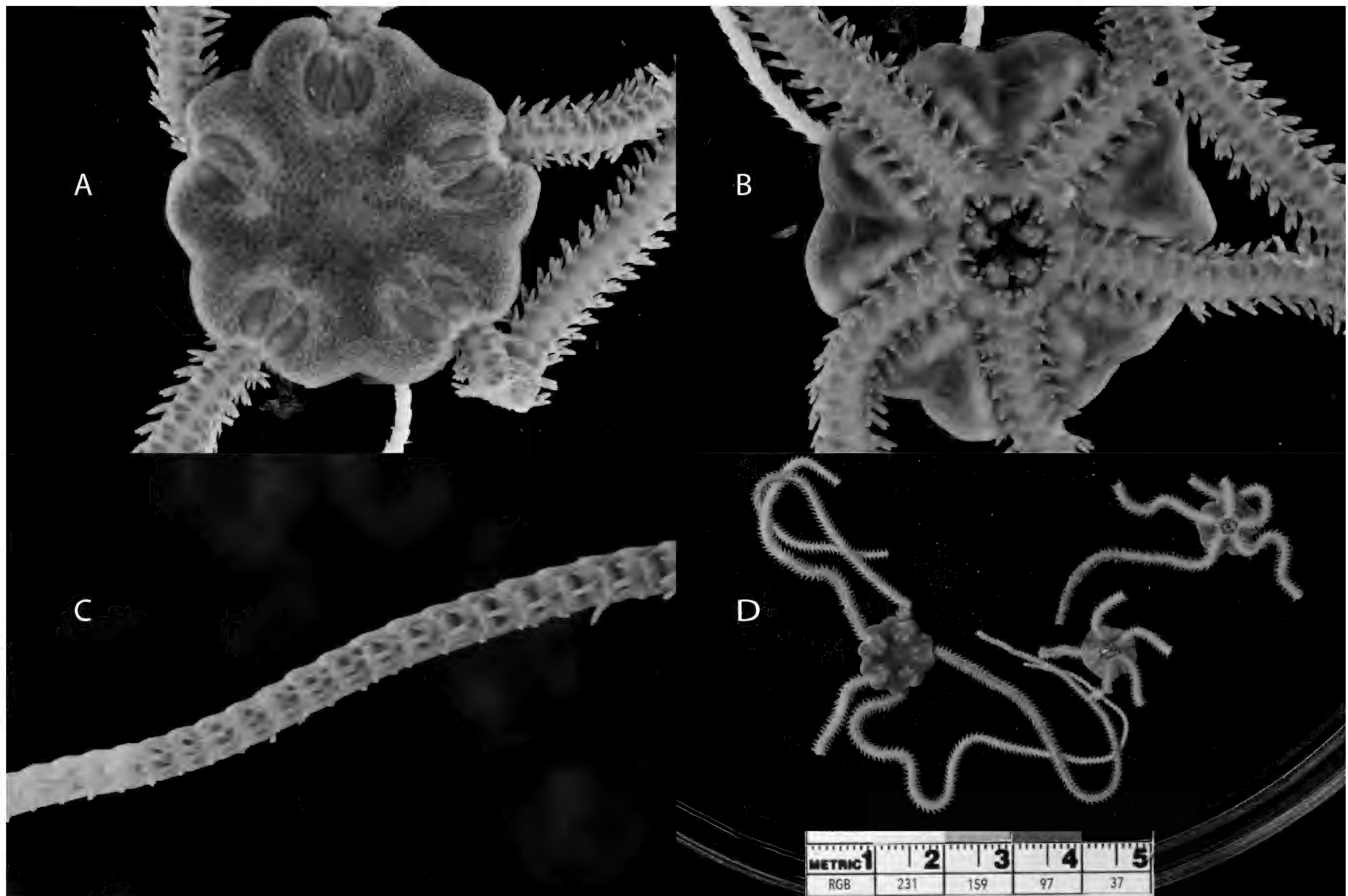
Amphioplus conductus Koehler, 1922

Figure 66. *Amphioplus conductus*. (A-C) NMV F193467 (Op 2, 11 mm dd) preserved, (A) dorsal, (B) ventral, (C) arm. (D) live colour.

Description of IOT material Disc to 11 mm dd, petaloid with margin indented radially and interradially, covered in a uniform coat of small scales, radial shields 'D'-shaped, 2.5x longer than wide, just in contact distally; disc scales ventrally are very thin and projecting; oral shields spear-head, slightly longer than wide; adoral shields large, triangular-shaped; 2 distal oral papillae (one jaw with 3) arranged around tube foot; DAPs with pointed distal margin; VAPs wider than long; 5-4 arm spines without asperities or thorns, almost smooth, swollen basally, cylindrical apically,

longest ventrally; 2 tentacle scales; grey disc, white arms.

Taxonomic remarks The similar species *A. legatus* differs in having thorns on the arm spines and narrow VAPs. These are the first records of *Amphioplus conductus* to be recorded since the holotype.

Distribution Philippines (704 m), IOT (1225–1626 m).

Ecology and life history Some of the IOT animals were hidden inside a large coral block. Dissected animal had a long narrow soft bodied object in its gut.

Amphiura cf. *demissa* Koehler, 1922

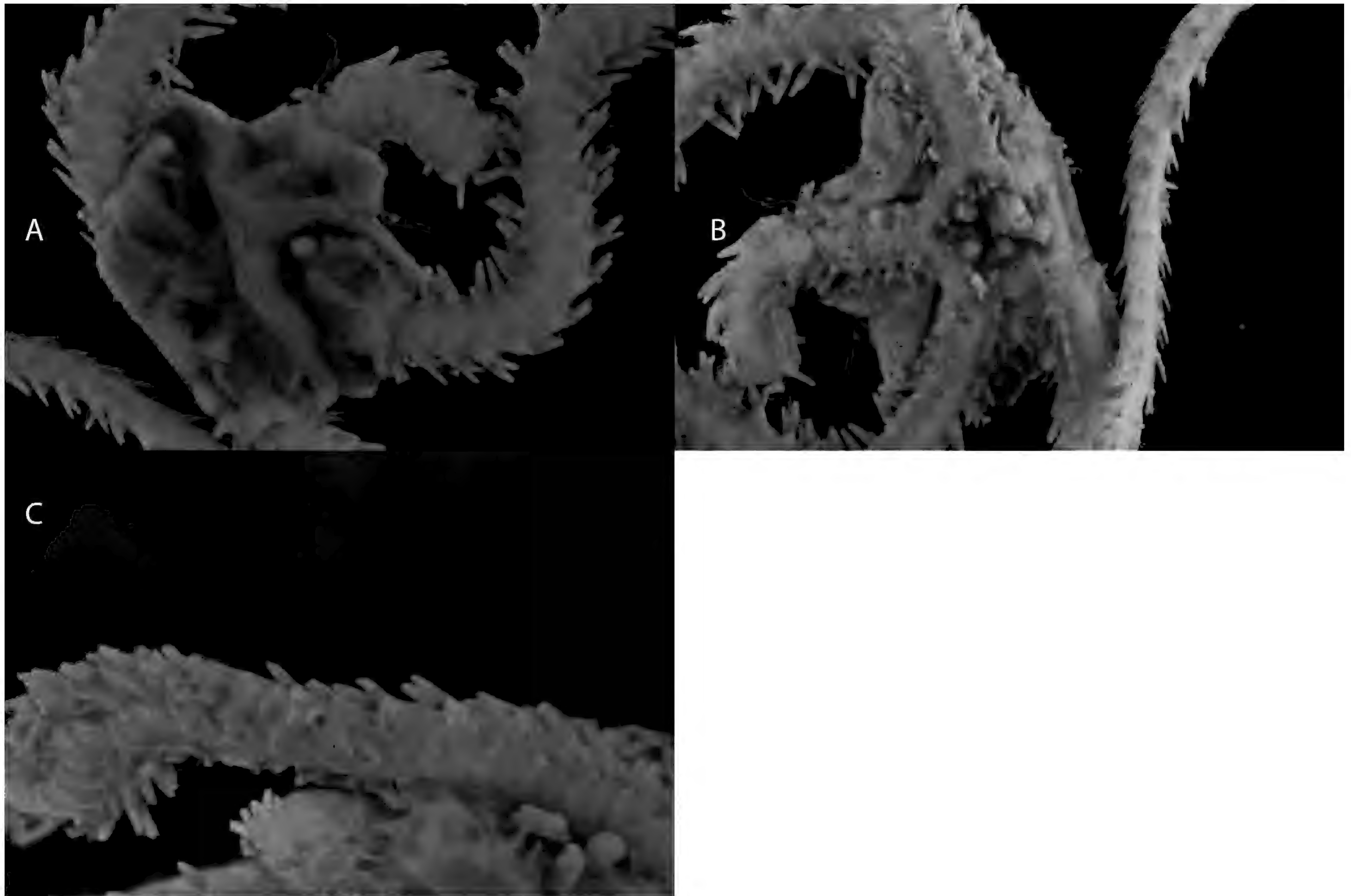


Figure 67. *Amphiura* cf. *demissa*. (A-C) NMV F305579 (Op 18, 4 mm dd) preserved, (A) dorsal, (B) ventral, (C) arm.

Description of IOT material Disc 4 mm dd, covered in fine scales, primaries small but evident; radials $\frac{1}{4}$ - $\frac{1}{5}$ dd, 2.5x longer than wide, proximally divergent; disc scaled ventrally; oral shield broadly triangular with an angle proximally and a distal lobe, length equals width; one small blunt lateral oral papilla; 4 then 3 blunt arm spines, surface rugose, hollow; one small triangular tentacle scale.

Taxonomic remarks This specimen is closest in morphology to *A. demissa* known only from 1344 m off the

Philippines. The unique type was double the size (8 mm dd) which makes comparison difficult. It differs in having up to 5 arm spines basally and smaller radial shields ($\frac{1}{7}$ x dd). *Amphiura concinna* (from 1158-2081 m in Indonesia) differs in lacking plates on the proximal half of the ventral disc surface. More material is required of these forms to assess species boundaries.

Distribution IOT (442-463 m).

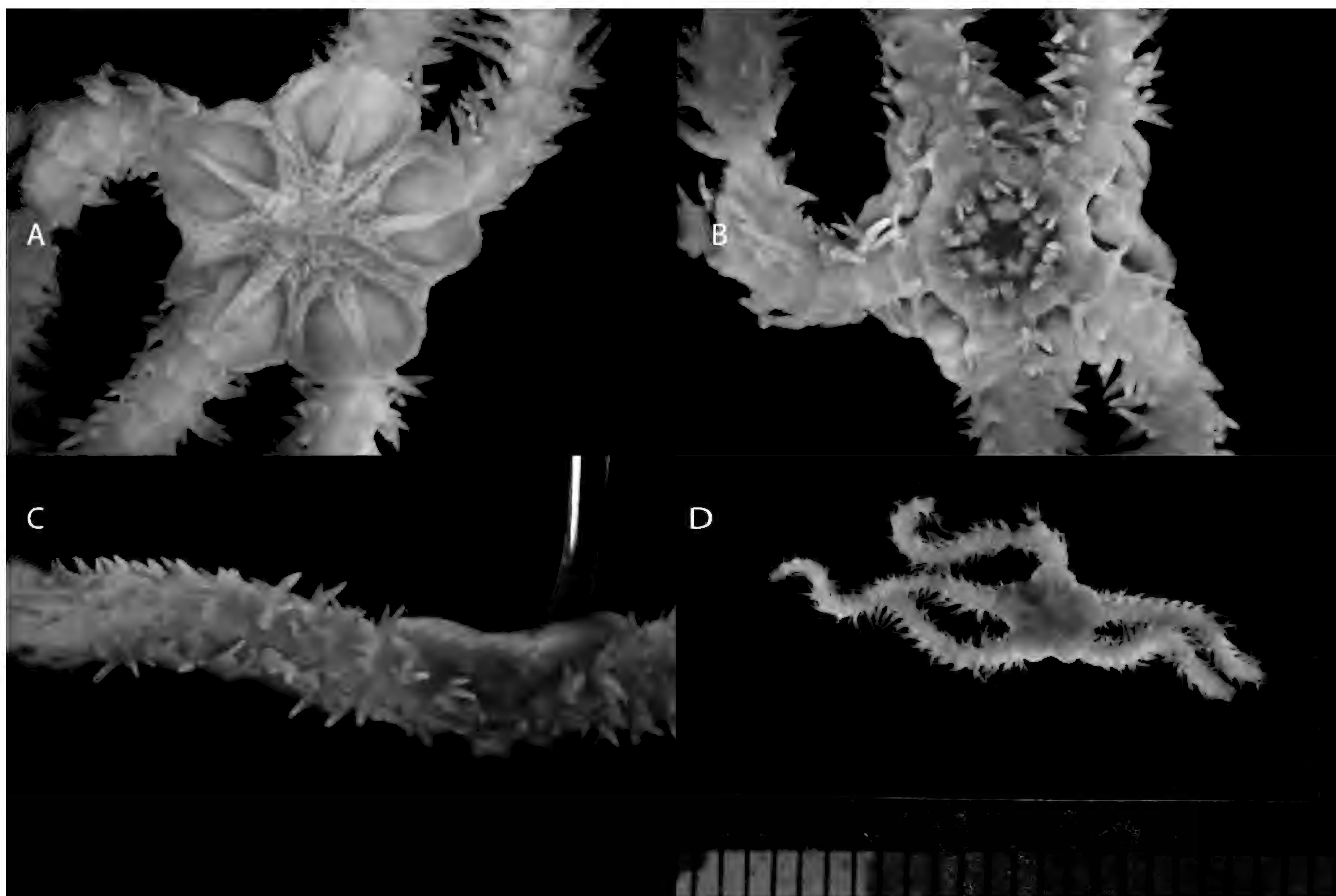
Amphiura cf. *glabra* Lyman, 1879

Figure 68. *Amphiura* cf. *glabra*. (A-D) NMV F308057 (Op 141, 3 mm dd) preserved, (A) dorsal, (B) ventral, (C) arm, (D) whole body.

Description of IOT material Disc 3 mm dd, disc dominated by the massive radial shields, to 1/3 dd, touch distally but proximally divergent; disc scales sparse ventrally; oral shield 2x wider than long; adoral shields do not meet interradially; single distal oral papilla spiniform; DAPs ovoid, slightly wider than long; VAPs longer than wide, separate; to five arm spines, lowest longer, especially around mid-arm, to 1.5 segments;

one oval tentacle scale.

Taxonomic remarks *Amphiura glabra* from the Philippines (930 m) has many similar features but differs in having smaller radial shields and subequal arm spines. *Amphiura concinna* from Indonesia (1158 m) also has smaller radial shields and 4 then 3 arm spines.

Distribution IOT (1110–1139 m).

Amphiura luetkeni Duncan, 1879

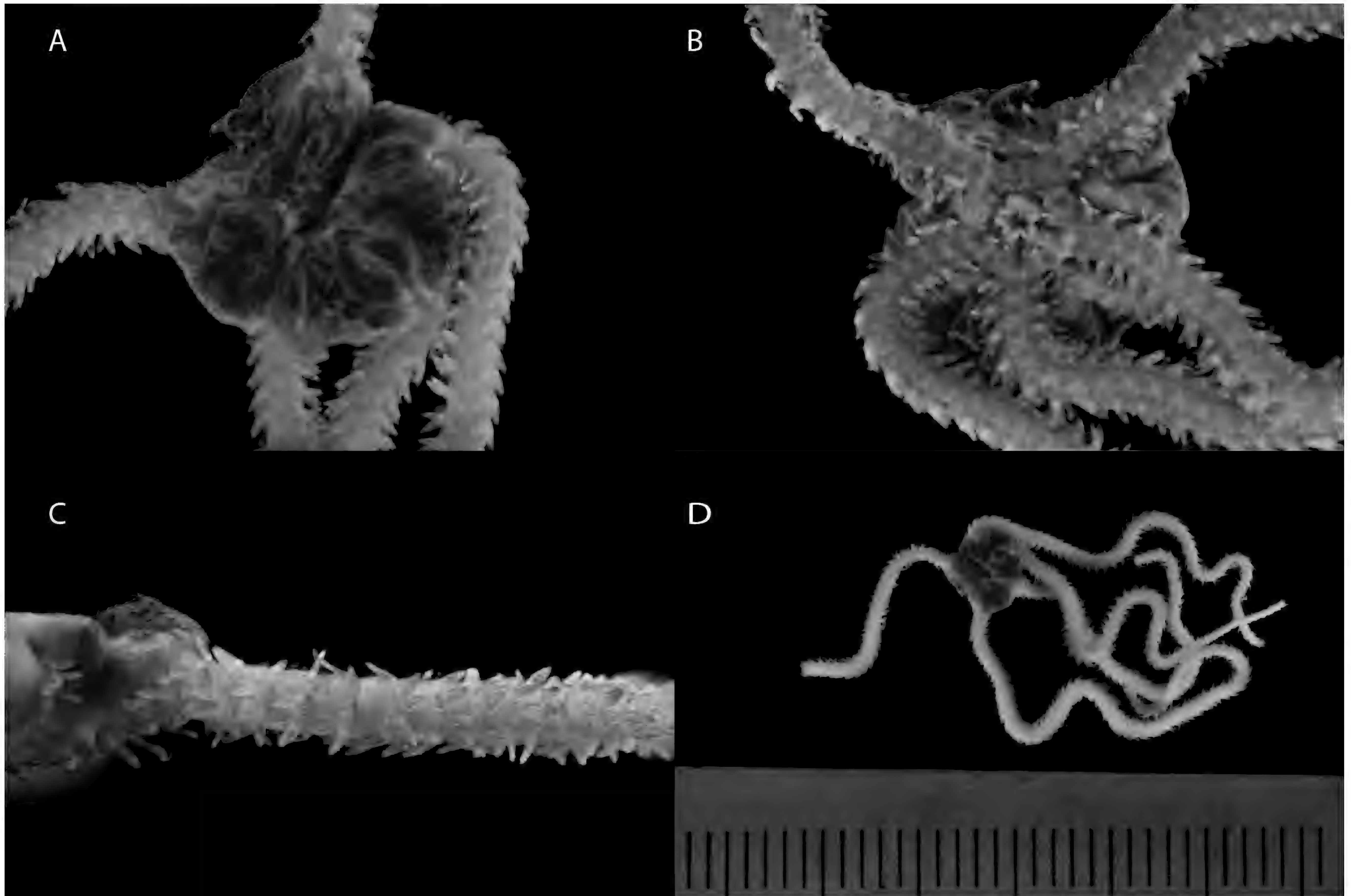


Figure 69. *Amphiura luetkeni*. (A-D) NMV F308123 (Op 179, 3 mm dd) preserved, (A) dorsal, (B) ventral, (C) arm. (D) whole body.

Description of IOT material Disc to 3 mm dd, covered in thin scales dorsally and ventrally; curved separate radial shields, 3x longer than wide; rhombic oral shield, 1.5x wider than long; spiniform distal oral papillae; sunken oral plate; six short conical arm spines, less than a segment in length; 1 small tentacle scale.

Taxonomic remarks This widespread species has also been known as *Amphiura duncani*.

Distribution Tropical Indo-West Pacific, from Madagascar to Moorea and Japan (0–170 m), IOT (111–121 m).

Family Hemieuryalidae

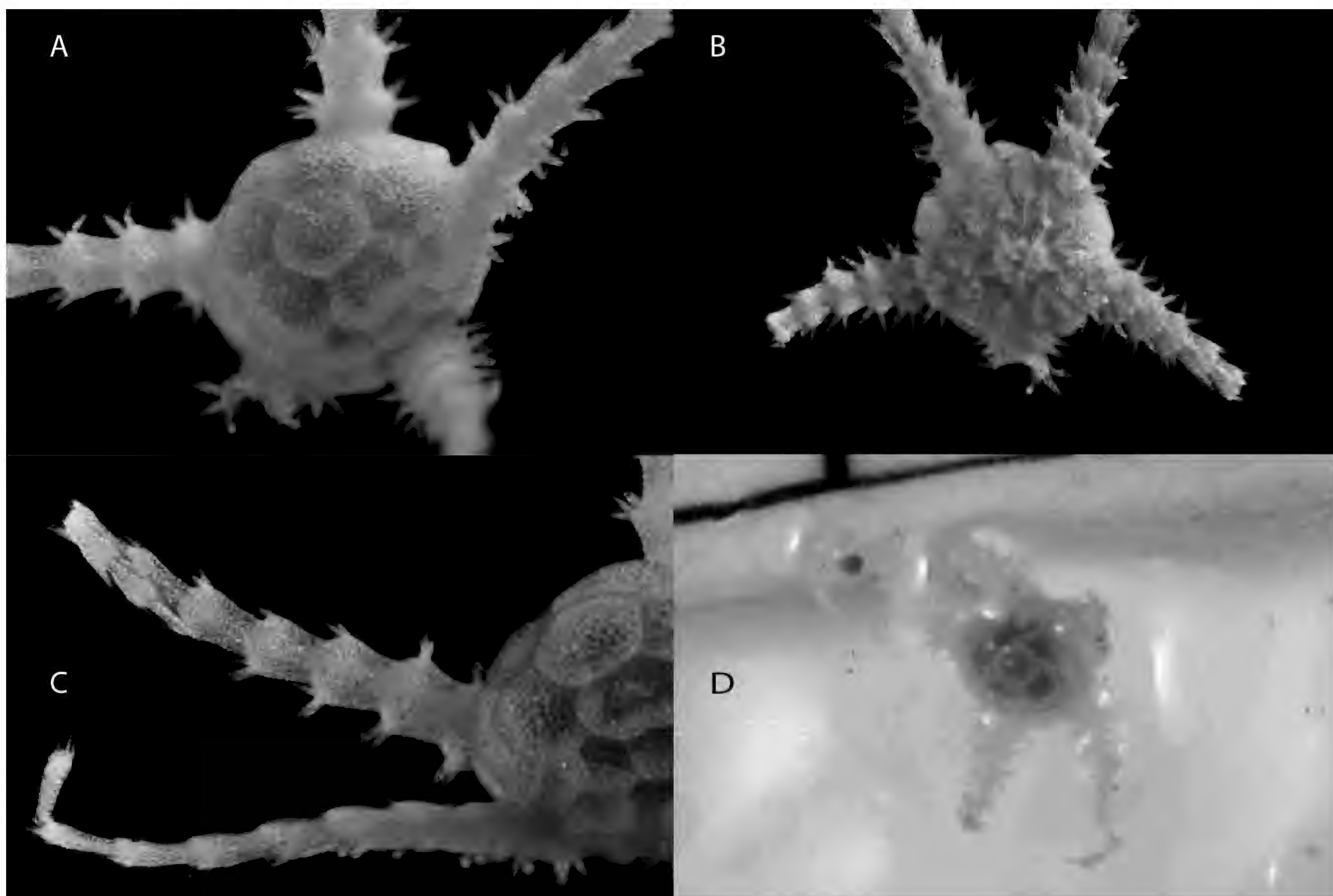
Ophiomastus sp.MoV.7351

Figure 70. *Ophiomastus* sp.MoV.7351. (A-D) NMV F305784 (Op 105, 2 mm dd) preserved, (A) dorsal, (B) ventral, (C-D) arms. (E) NMV F305522 (Op 7, 1 mm dd) live colour.

Description of IOT material Disc to 2 mm dd, covered in overlapping pitted plates, primaries prominent but rather asymmetrically placed, some secondaries between radial shields and interradially, radials present but outlines obscured; oral shield droplet shaped, adoral shields proximal to oral shields, 1 or 2 ventral disc plates; oral papilla bar-like, forming the edge of the jaw; arms short and curved, 1.5x dd, DAPs kite-shaped, widely separated; VAPs small, longer than wide, widely separate; 3 then 2 pointed arm spines, to 0.5x segment

in length; one oval flat tentacle scale, almost the length of the VAP.

Taxonomic remarks These specimens cannot be assigned to any known species, but they are very small and perhaps haven't fully developed adult characters.

Distribution IOT (2298- -3345 m).

Ecology and life history Found in small holes in sunken wood.

Ophiomastus sp.MoV.5228

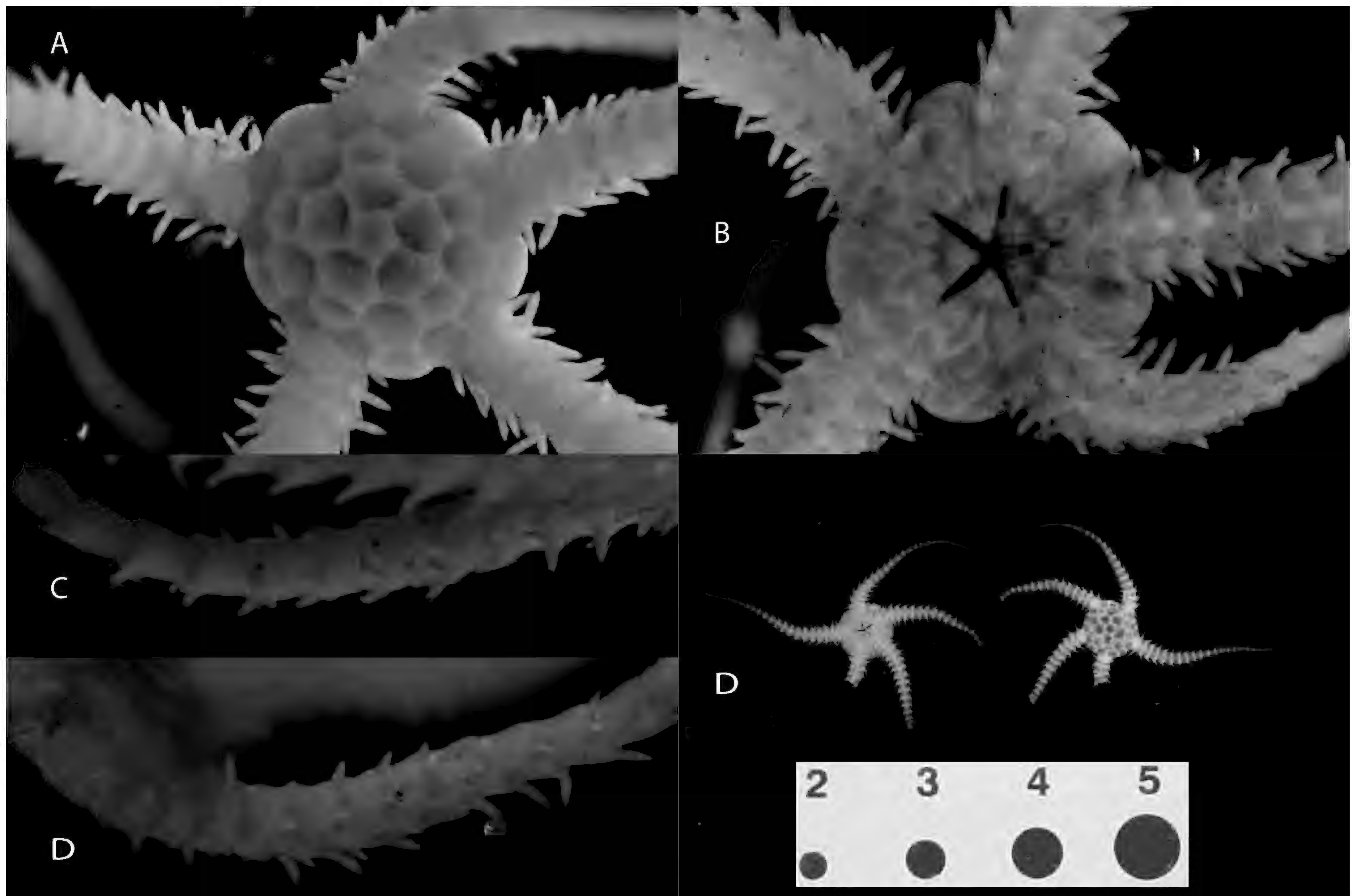


Figure 71. *Ophiomastus* sp.MoV.5228. (A-D) NMV F305581 (Op 18, 4 mm dd) preserved, (A) dorsal, (B) ventral, (C-D) arms. (E) NMV F308044 (Op 128, 5 mm dd) live colour. (Circles in mm.)

Description of IOT material Disc to 5 mm dd, covered in 4 rings of plates (centrodorsal, primary plates, secondary plates, and radial shields-marginal plate), plates polygonal, wider than long, with a pitted surface, without smaller intercalary plates; ventral disc surface with 3 plates; no arm comb; arms short, 3x dd, dorso-ventrally flattened; DAPs triangular, separate; 2, rarely 3, arm spines, upper longest but less than an segment in length; one flap-like oval tentacle scale that articulates on the LAP, sometimes with a smaller rim-like scale on VAP, similar scales protect the 2nd oral tentacle pore; live colour: disc plates and dorsal arm segments reddish, outlined in white.

Taxonomic remarks This undescribed species has been found on numerous surveys conducted by the Muséum National d'Histoire Naturelle in the western Pacific. It differs from *O. tumidus* and *O. perplexa* in having a complete circle of 10 secondary plates on the dorsal disc.

Distribution East-Indo-West Pacific, IOT to New Caledonia and north to Taiwan (305–1114 m); IOT (328–1114 m).

Ecology and life history Female gonads with large eggs.

Family Ophiactidae

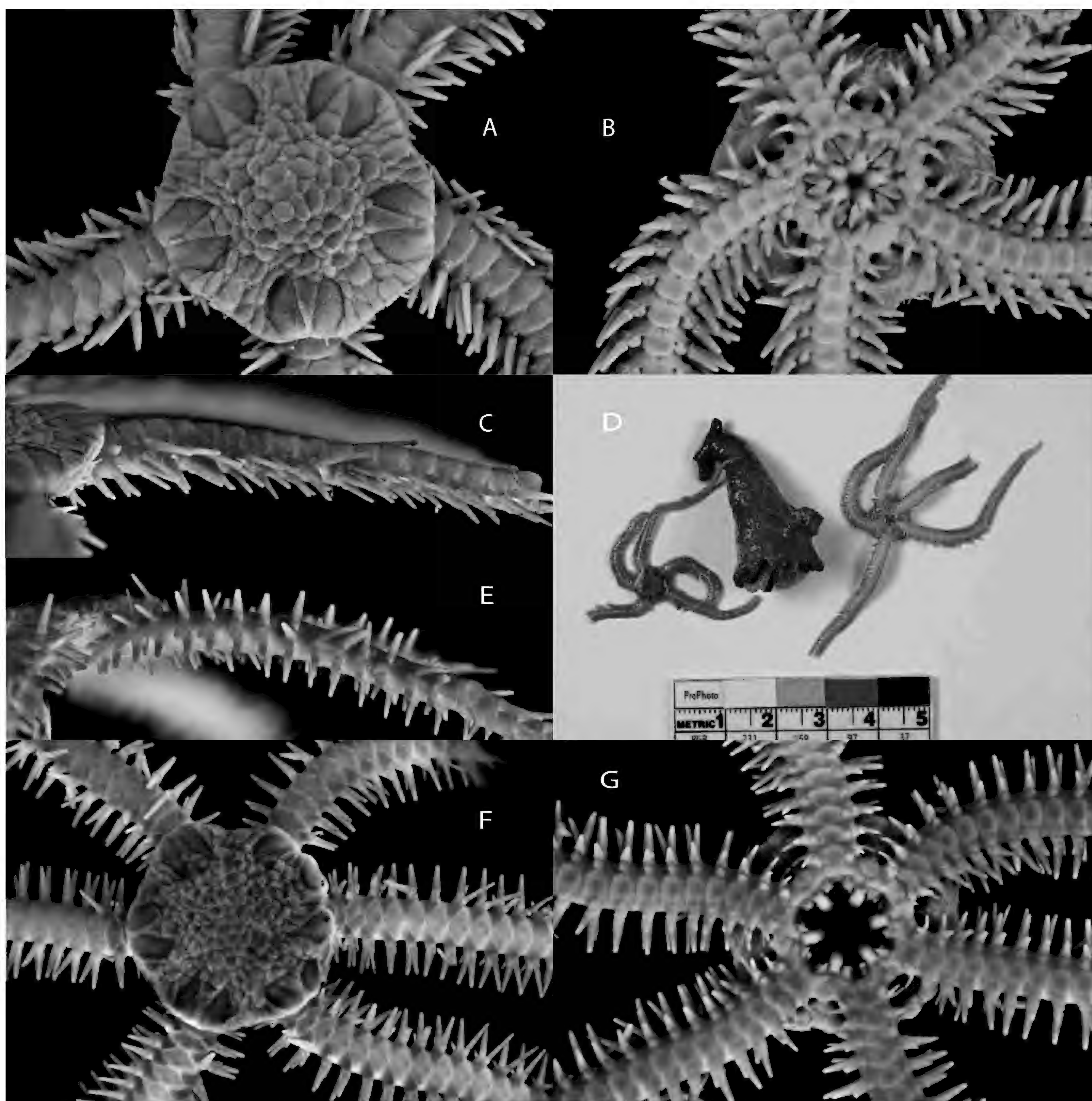
Ophiactis brachygens H.L. Clark, 1911

Figure 72. *Ophiactis brachygens*. (A-D) NMV F305615, 5-armed (Op 5, 7 mm dd) preserved, (A) dorsal, (B) ventral, (C) arm, (D) live colour; (E-G) NMV F308095, 6-armed (Op 136, 2.5 mm dd) preserved, (E) arm, (F) dorsal, (G) ventral.

Description of IOT material Disc pentagonal to 7 mm dd, covered in overlapping rounded scales, a few spines on ventral side, none dorsally; radial shields D-shaped, proximally divergent, to $\frac{1}{4}$ dd; one distal oral papilla on the side of each jaw, triangle to parallelogram-shaped, with a pointed proximal apex, 2x longer than wide; arms five, occasionally 6 equal ones; DAP triangular with straight to slightly convex distal margin, 2x wider

than long, just contiguous; 4-3 arm spines, subequal or upper a little longer; one round tentacle scale on LAP; live colour grey disc and pinkish arms.

Taxonomic remarks There is a complex of bathyal Indo-Pacific *Ophiactis* species with a single enlarged oral papilla on the side of the jaws. Evidence from nuclear and mtDNA sequences (Christodoulou *et al.*, 2019) indicates that there are at least 3 distinct clades

with partially overlapping bathymetric distributions, that could be named *O. 'brachygens'* (= *O. definita*) (160-876 m), *O. 'flexuosa'* (580-1017 m), and *O. 'perplexa'* (800-1713 m) based on their type localities. Another species, *O. nama* from 390-1116 m off Fiji differs in having numerous spines on the dorsal disc. All these forms normally have five-sized equal arms, however, individuals with 6 arms do exist including within the *O.*

'brachygens' (which have been called *O. 'pteropoma'*, see Fig E-G) and *'perplexa'* clades (see below).

Distribution Japan to SW Pacific (see above), IOT (643–997 m).

Ecology and life history Specimens found in holes in coral debris.

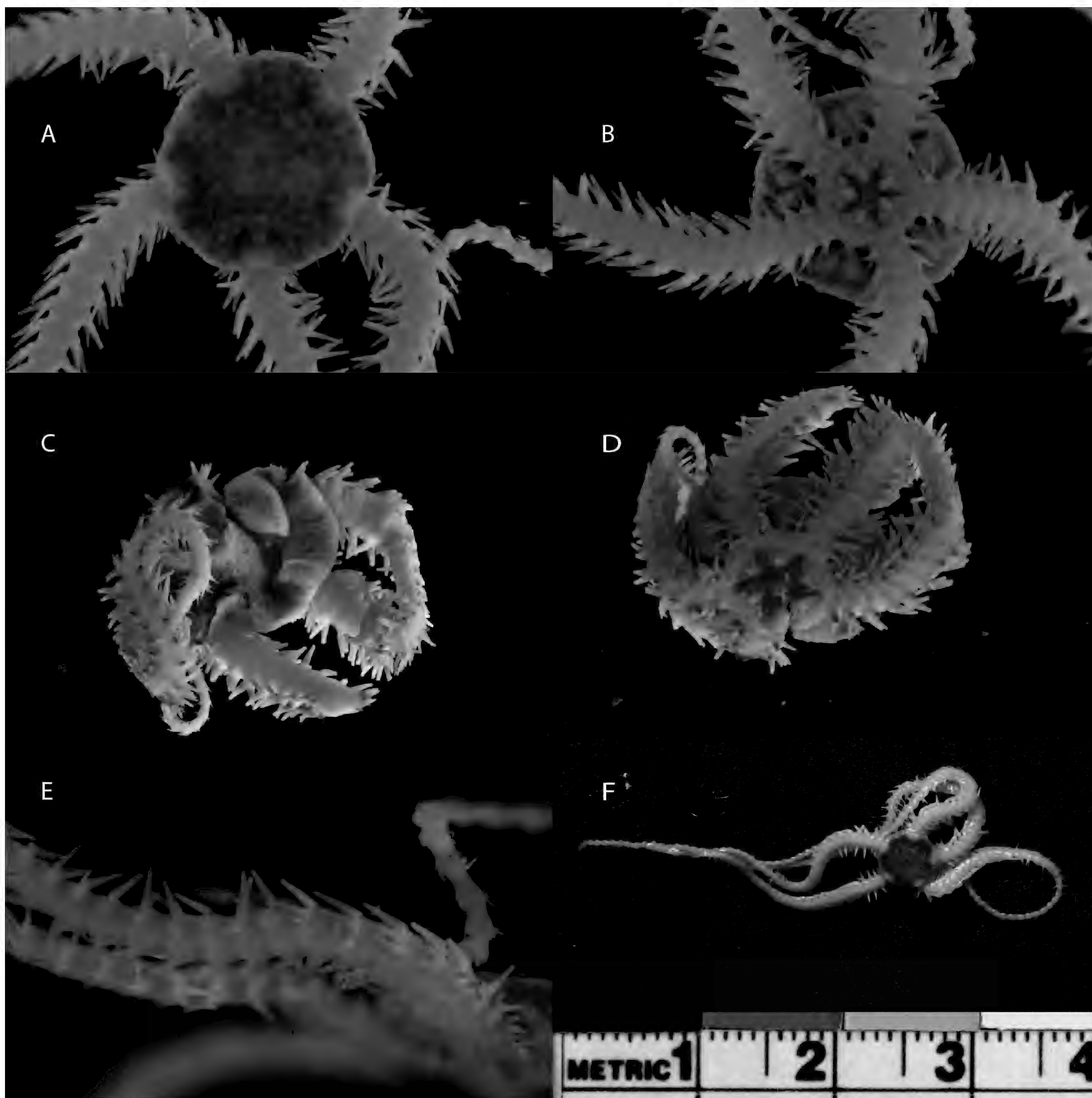
Ophiactis perplexa Koehler, 1897

Figure 73. *Ophiactis perplexa*. (A-B) NMV F305568 (Op 9, 3.5 mm dd) preserved, (A) dorsal, (B) ventral, (C-E) NMV F305524 (Op 37, 6 mm dd) preserved (C) dorsal, (D) ventral, (E) arm; (F) NMV F305597 (Op 111, 4 mm dd) live colour.

Description of IOT material Disc to 6 mm dd, covered in coarse plates, primaries evident centrally, radial shields $1/5=1/8$ x dd, almost touching distally but proximally divergent; a few rod-like disc spines around periphery or in centre; small cruciform oral shield, 2x wider than long; jaw apex with tricuspid tooth; single distal oral papilla, variable in size from large and operculate to small, often widened at the apex, buccal scale deeper in jaw; 5, rarely 6 equal (i.e. not fissiparous), arms; DAPs fan-shaped, 2x wider than long, just separate; 3 arm spines, uppermost slightly longer than a segment; one oval tentacle scale; live

colour: grey disc, white at distal ends of radial shields, with pinkish-white arms.

Taxonomic remarks See *O. definita* above. It is very difficult to separate the two species morphologically, but in general *O. perplexa* occurs deeper than *O. definita*. The one specimen with six-equal arms has one ray with a single wide radial shield rather the usual pair.

Distribution East Indo-West Pacific, from India to Moorea, Taiwan to SE Australia (800–1948 m); IOT (957–1850 m).

Ophiactis hirta Lyman, 1879

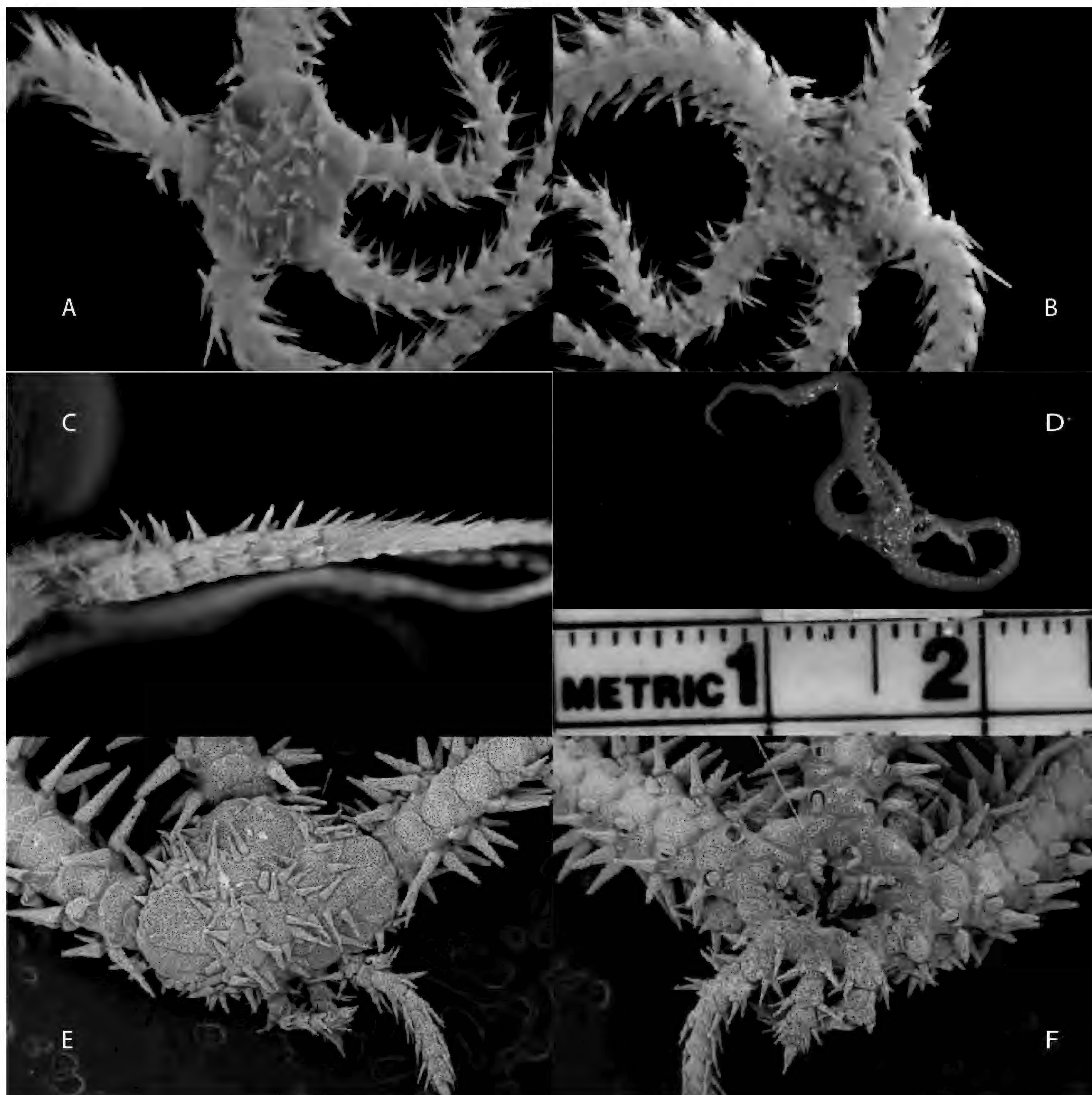


Figure 74. *Ophiactis hirta*. (A-D) NMV F308052 (Op 136, 2.5 mm dd) 5 arms preserved, (A) dorsal, (B) ventral, (C) arm, (D) (6 arms, fissiparous) live colour, (E) SEM dorsal, (F) SEM ventral.

Description of IOT material Disc to 2.5 mm dd, covered in disc plates that bear tall sharp spines; radial shields 1/5 dd; jaw apex terminated in tricuspid tooth, with 2 (rarely 3) rounded distal oral papillae; mostly 6 armed (but one 5- and one 7-armed), fissiparous, typically with 3 regenerating arms; DAPs oval with rounded distal margin; to 5 arm spines, upper longest to 1.5 segments in length; one oval tentacle scale.

Taxonomic remarks This species is characterised by the strongly convex distal margin on the dorsal arm plates and the presence of 2 oral papillae at the side of each jaw. Most specimens have been found with 6 or 7 arms and it can divide asexually by fission (Figs E, F). In the

Atlantic Ocean, a very similar (or identical) species is known as *O. nidarosiensis*. Large five-armed individuals have been recorded from both sides of the Indian Ocean that fit within this genetic clade (unpublished observations).

Distribution Indo-West Pacific, including southern Australia and New Zealand (87–1140 m); IOT (754–890 m).

Ecology and life history Can divide asexually by fission.

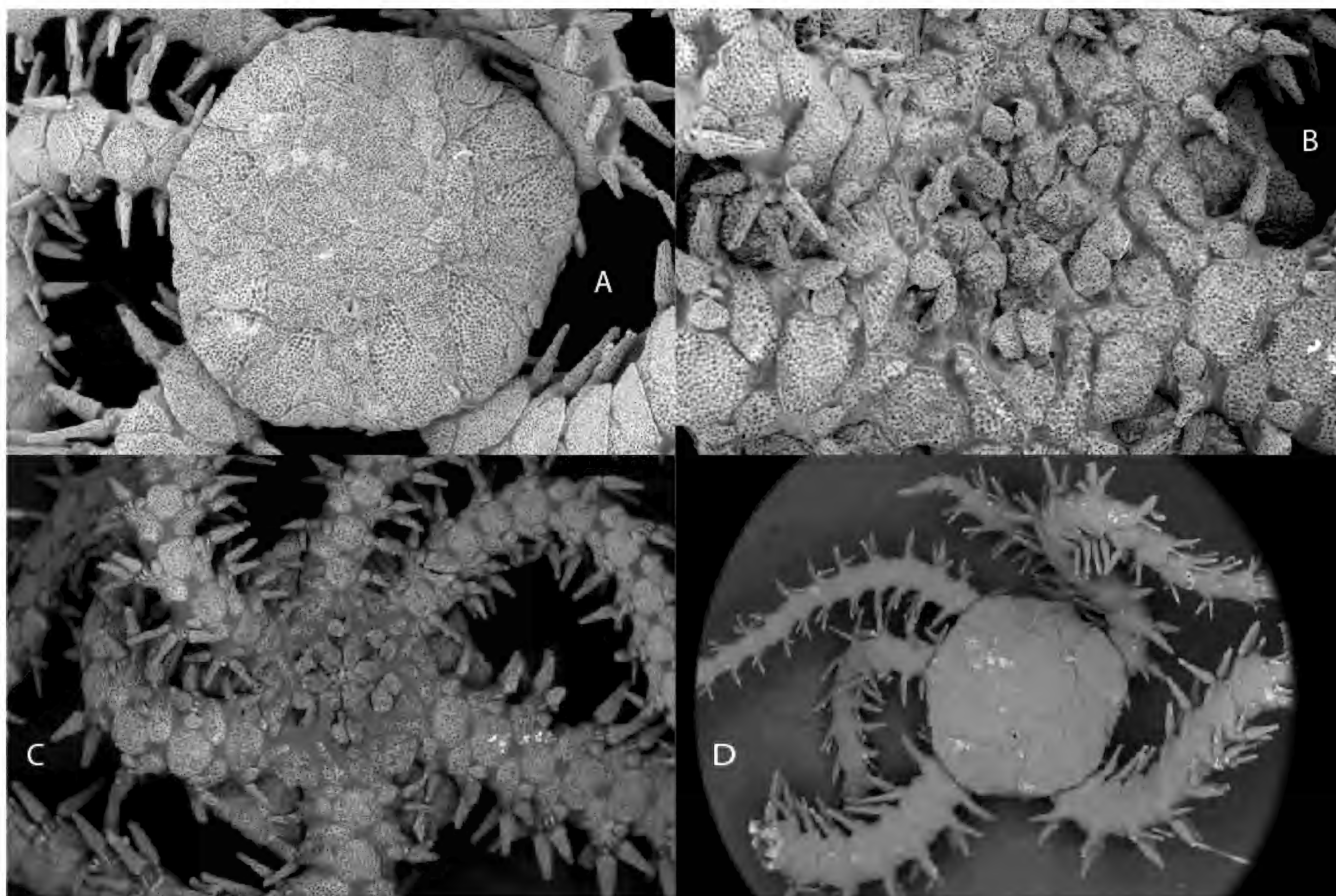
Ophiactis plana Lyman, 1869

Figure 75. *Ophiactis plana*. (A-D) NMV F 308107 (Op 165, 2.9 mm dd) preserved, SEM, (A) dorsal, (B) oral frame, (C) ventral, (D) whole body.

Description of IOT material Disc to 3.5 mm dd, radial shields proximally divergent, $\frac{1}{4}$ to $\frac{1}{5}$ x dd; no disc spines; 6 jaws; oral shield rhomboid, 2x wider than long; tricuspid to centrally pointed teeth; 1 quadrilateral lateral oral papilla hiding 1-2 conical buccal scales; 6 arms, usually 3 thinner and shorter than the rest; DAPs fan-shaped, 2x wider than long, with a slightly convex to straight distal edge, separate; VAPs separate; 3 arm spines, just exceeding 1 segment in length; 1 oval tentacle scale.

Taxonomic remarks *Ophiactis plana* is a fissiparous species, widespread in tropical oceans at bathyal depths.

It is usually found with 3 large and 3 smaller/thinner arms. Specimens with 6 equal sized arms can sometimes belong to typically 5-armed species with a single lateral oral papilla such as *O. brachygens* and *O. perplexa*. The sympatric fissiparous species *O. hirta* differs in having 2 lateral oral papillae and ovoid DAPs.

Distribution Tropical to temperate Atlantic, Indian and Pacific Oceans (25–1644 m); IOT (932–1139 m).

Ecology and life history One specimen was found within a small glass sponge (Op 141).

Family Ophiolepididae

Ophiotypa simplex Koehler, 1897

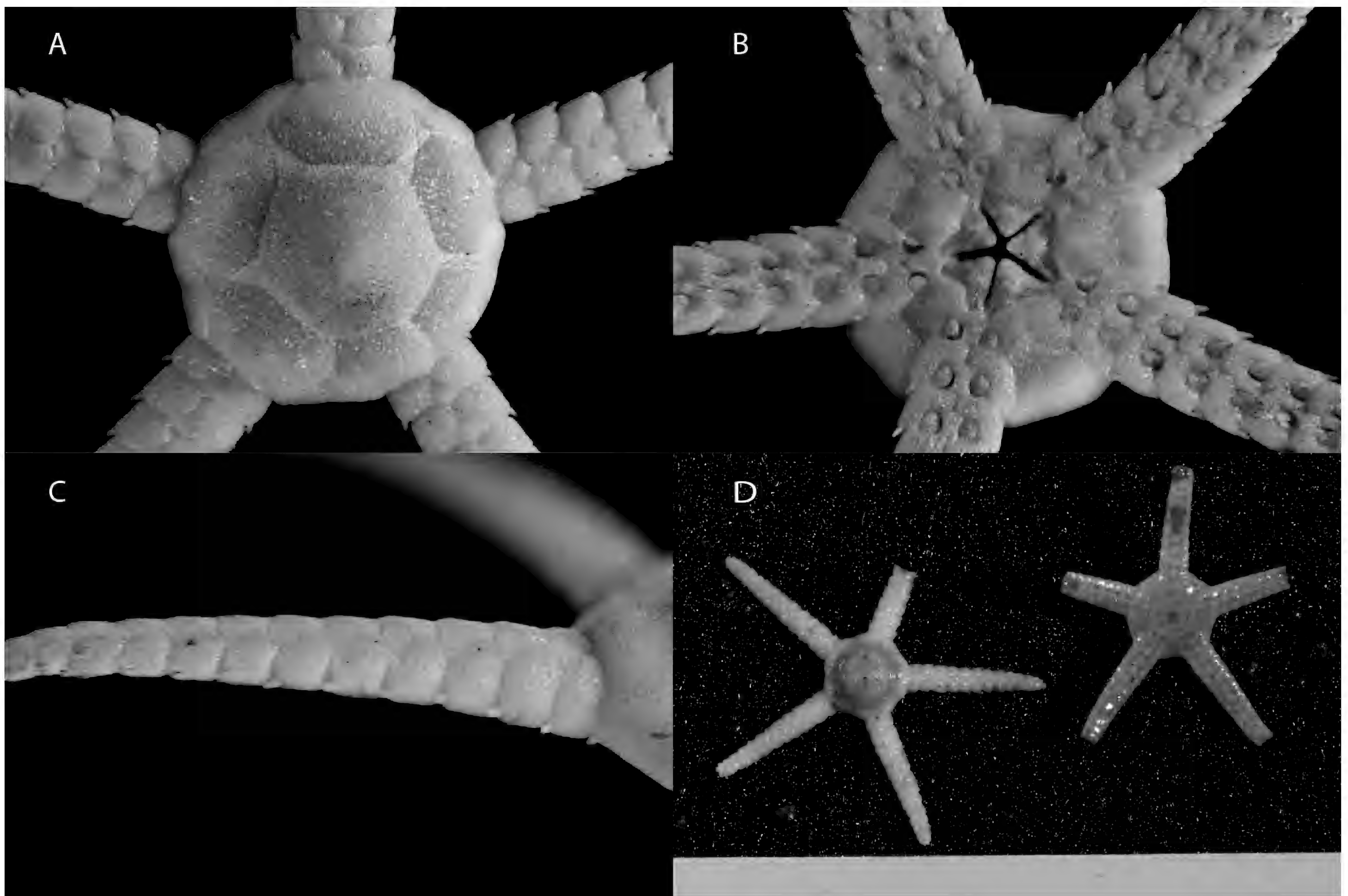


Figure 76. *Ophiotypa simplex*. (A-D) NMV F305620 (Op 28, 4 mm dd) preserved, (A) dorsal, (B) ventral, (C) arm; (D) NMV F 307628 (Op 103, 4.5 mm dd) live colour.

Description of IOT material Disc round to 5.5 mm dd, covered by the large centrodorsal, a ring of primary radial plates, wide marginal plates and a few intercalary plates between; no arm comb; ventral disc covered in large trapezoid oral shield; contiguous adoral shields proximal to orals; arms short, less than 2x dd; DAPs and VAPs small and widely separate; one ventral arm spine, 1/5 segment in length; one oval scale covers each tentacle pore.

Taxonomic remarks Only species known from genus,

and the only abyssal species known from the Ophiolepididae. Differs from the superficially similar *Ophiopyrgus trispinosus* by the presence of a single oval tentacle scale covering the arm pores.

Distribution Atlantic, Indian and Pacific Oceans, predominantly from tropical latitudes (1200–6500 m), IOT (2760–4047 m).

Ecology and life history Presumably lives in soft sediment.

Family Ophionereididae

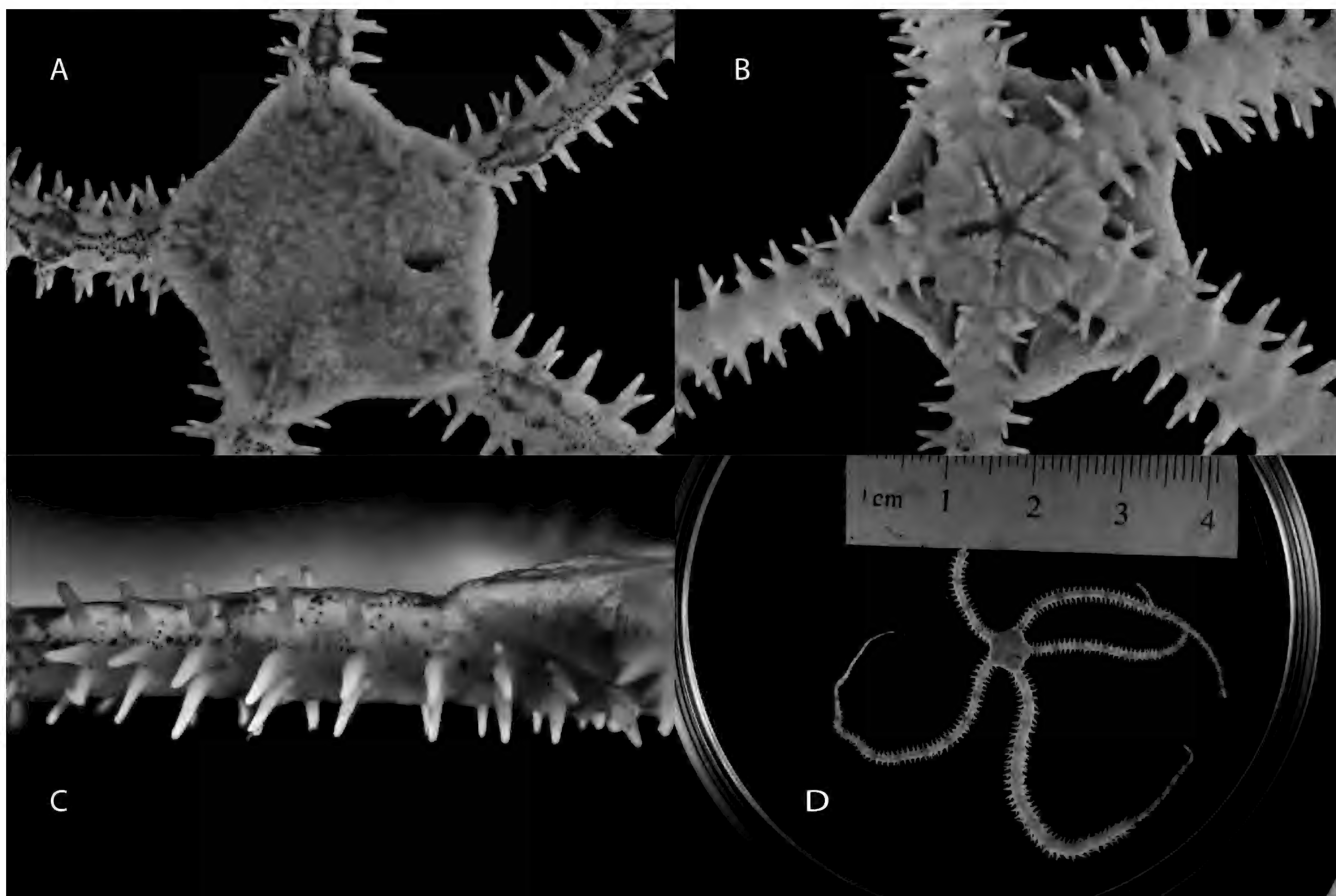
Ophionereis cf. *porrecta* (Lyman, 1860)

Figure 77. *Ophionereis* cf. *porrecta*. (A-D) NMV F308119 (Op 179, 8 mm dd) preserved, (A) dorsal, (B) ventral, (C) arm. (D) whole body.

Description of IOT material Disc to 8 mm dd, covered in thin overlapping plates, greater in size on margin adjacent to radial shields, radial shields 2.5x longer than wide; genital granules present, especially near oral shield, but do not extend to dorsal surface; 5 arms; DAPs rounded, 1.3x wider than long, basal supplementary DAPs confluent with distal 2/3 of DAP, but separate; 3 rounded arm spines, as long as a segment; 1 oval tentacle scale, $\frac{1}{2}$ as long as the VAP; brown markings and tiny spots running down midline of dorsal arm surface, widened every 5th segment, inner edge of

radial shields brown.

Taxonomic remarks *Ophionereis porrecta* is a complex of species (Boissin *et al.*, 2017). The IOT specimens form a separate mtDNA lineage within this complex. The IOT animals are small compared to the large size *O. porrecta* can become (35 mm dd) and some characters (e.g. separation of the supplementary DAPs) may reflect this small size.

Distribution IOT (111–121 m).

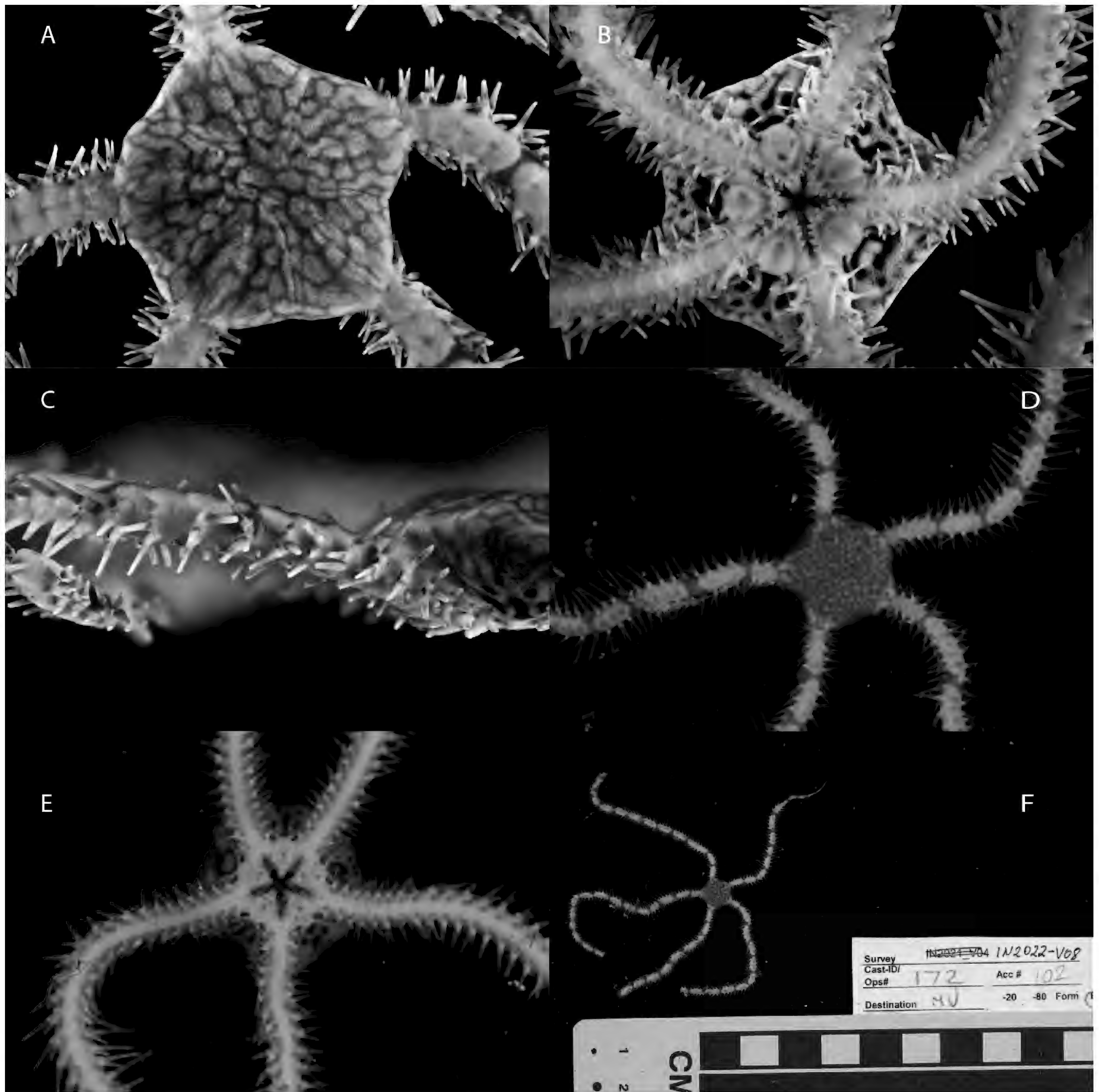
Ophionereis sp.MoV.7352

Figure 78. *Ophionereis* sp.MoV.7352. (A-F) NMV F308113 (Op 172, 8 mm dd), preserved (A) dorsal, (B) ventral, (C) arm, live colour (D) dorsal, (E) ventral, (F) whole body.

Description of IOT material Disc pentagonal, to 8 mm dd, covered in fine scales (0.075 mm dia), not enlarged around margin, disc naked ventrally; a series of sharp genital granules persist along slit from the oral shield to the disc margin, these persist dorsally as a cluster of small spines at the base of the arm (Fig. A); oral shield slightly longer than wide, with an angled proximal angle and a rounded distal edge; 5 separated pointed lateral oral papillae; DAPs 2x as wide as long, contiguous, supplementary DAPs present, contiguous with

distal ½ of DAP; 3 arm spines, cylindrical to slightly flattened, subequal at base, but middle spine becoming very elongated by mid-arm, up to 3 segments in length, with a slightly capitate tip; 1 large oval tentacle scale. Live colour: disc grey with a reticulate pattern of brown lines, arms with brown dumbbell-shaped markings every 4-6 segments.

Taxonomic remarks DNA evidence indicates that *Ophionereis dubia* is a complex of species (Christodoulou *et al.*, 2019). This IOT specimen differs from *O. dubia*

sensu stricto in having a much longer middle arm spines in mid-arm (Fig. E) and a series of acute genital papillae that extend dorsally as a cluster of spines distal to the radial shields. The clade is sister to all other dubia-group samples. *Ophionereis intermedia*, the only

other species with genital papillae in the dubia-group, does not have spines across the dorsal arm base nor extended middle arm spines.

Distribution IOT (169–176 m).

Ophionereis thryptica (Murakami, 1943)

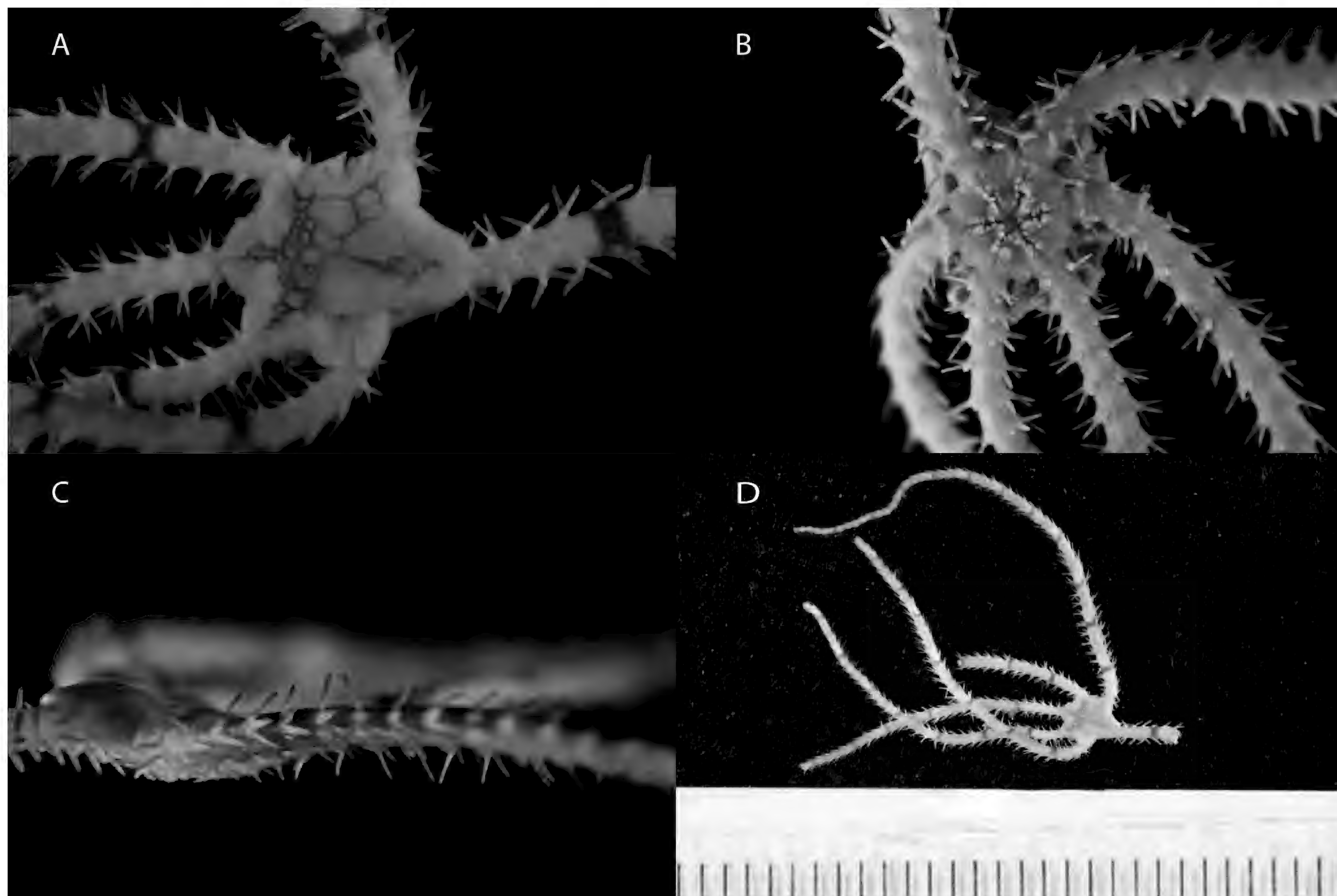


Figure 79. *Ophionereis thryptica*. (A-D) NMV F308120 (Op 179, 2 mm dd) preserved, (A) dorsal, (B) ventral, (C) arm. (D) whole body.

Description of IOT material Disc petaloid, to 2 mm dd, covered in minute plates, radial shields naked, 3x longer than wide, attenuating proximally, rounded distally, separate; no genital granules; oral shields longer than wide, spear-head-shaped; 4 rounded lateral oral papillae; 6 equal arms, not fissiparous, > 10 mm; DAPs ovoid, slightly longer than wide, supplementary DAPs confined to distal corner of DAP, can have tiny secondary plates distal to the main supplementary one;

3 subequal slightly-flattened arm spines, as long as a segment; 1 large oval tentacle scale. Colour: disc with fine reticulate brown lines, arms banded with brown every 4-5 segments.

Taxonomic remarks The similar 6-armed *O. hexactis* differs in having radial shields covered in disc scales.

Distribution W Pacific, Japan, Indonesia, Indian Ocean (52–275 m), IOT (111–121 m).

Ophioplax sp.MoV.7330

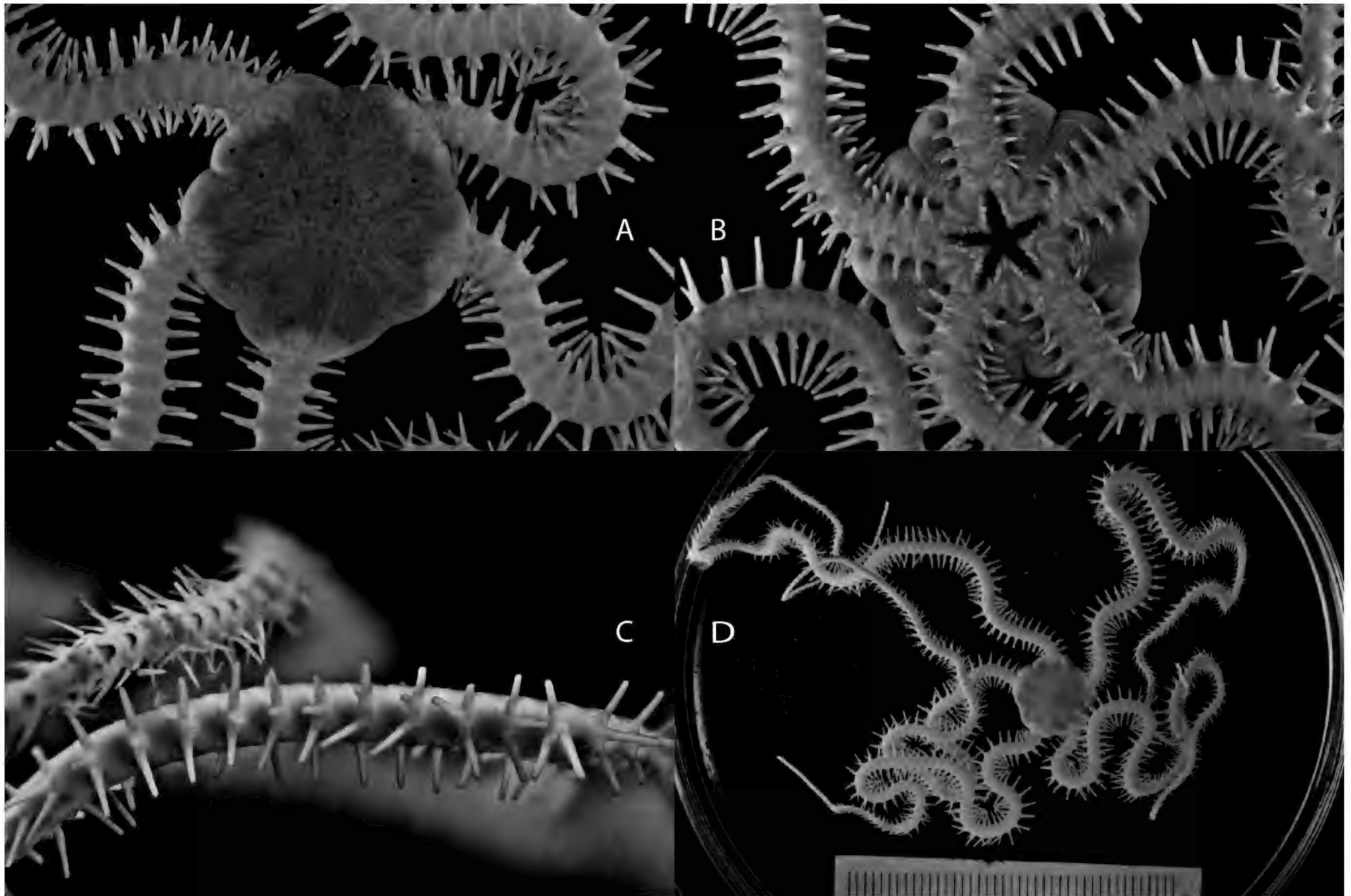


Figure 80. *Ophioplax* sp.MoV.7330. (A-D) NMV F308090 (Op 179, 11 mm dd) preserved, (A) dorsal, (B) ventral, (C) arm. (D) whole body.

Description of IOT material Disc to 11 mm dd, slightly swollen around arm base and incised interradially; disc covered in small plates, primaries not notably larger, radial shields 4x length/width, widest centrally, separate; disc margins and ventral surface covered in tiny dense granules, a few on basal DAPs as well; oral shields spear-head shaped, 2x length/width, distally lobed; Five lateral oral papillae, outer widened; arms >10x dd; DAPs trapezoid with convex distal edge, 2x width/length, contiguous; 3 arm spines, cylindrical with blunt tip, middle longest to 1.7x segments; one

rounded tentacle scale, 1-several smaller rim like scales; tube feet tipped with purple.

Taxonomic remarks These specimens are close to *Ophioplax lamellosa* from Japan, *O. custos* from Indonesia/Papua New Guinea, *O. ljunghmani* from the Atlantic, and an undescribed species from the SW Pacific.

Distribution Western Indian Ocean (Mozambique Channel, Madagascar, Saya de Malha Bank, 202–1179 m). IOT (328–528 m).

Family Ophiothamnidae

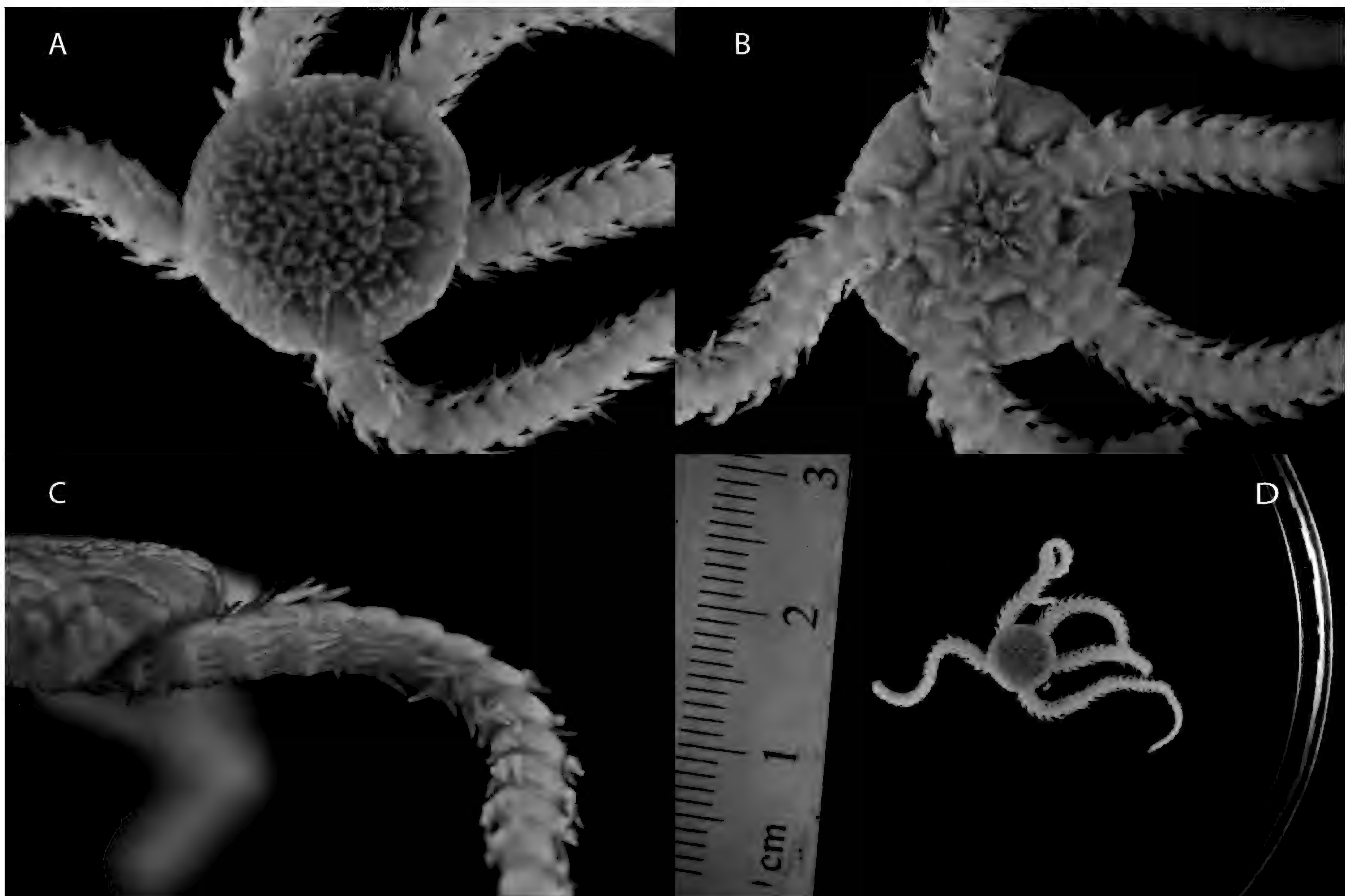
Histampica sp.MoV.7353

Figure 81. *Histampica* sp.MoV.7353. (A-D) NMV F308075 (Op 131, 5.5 mm dd) preserved, (A) dorsal, (B) ventral, (C) arm. (D) whole body.

Description of IOT material Disc to 5.5 m dd, round, covered in coarse plates, thickened on their distal edges, radial shields touch distally but divergent proximally, 1/6x dd; oral shields triangular, with straight distal edge, 2x wide as long; jaw apex terminated in the ventralmost tooth, which is rounded to tricuspid; 5 lateral oral papillae, the inner 2 are conical (the second is possibly the buccal scale), the next 2 are scale-like, founded to polygonal, the outer one is small and adpressed; DAPs fan-shaped, wider than long, separate; VAPs wider than long, separate; to 5 arm spines, uppermost

slightly longer, to 1 segment in length; 2 pincer-like tentacle scales.

Taxonomic remarks These specimens differ from the typical specimen of *O. duplicata* in having more than 3 arm spines. *Histampica duplicata* has been reported from a range of depths (35-2691 m) from the topical Indian, Pacific and Atlantic Oceans. A revision of the genus is required.

Distribution IOT (1019–1896 m).

Family Ophiotrichidae

Ophiothrix purpurea Martens, 1867

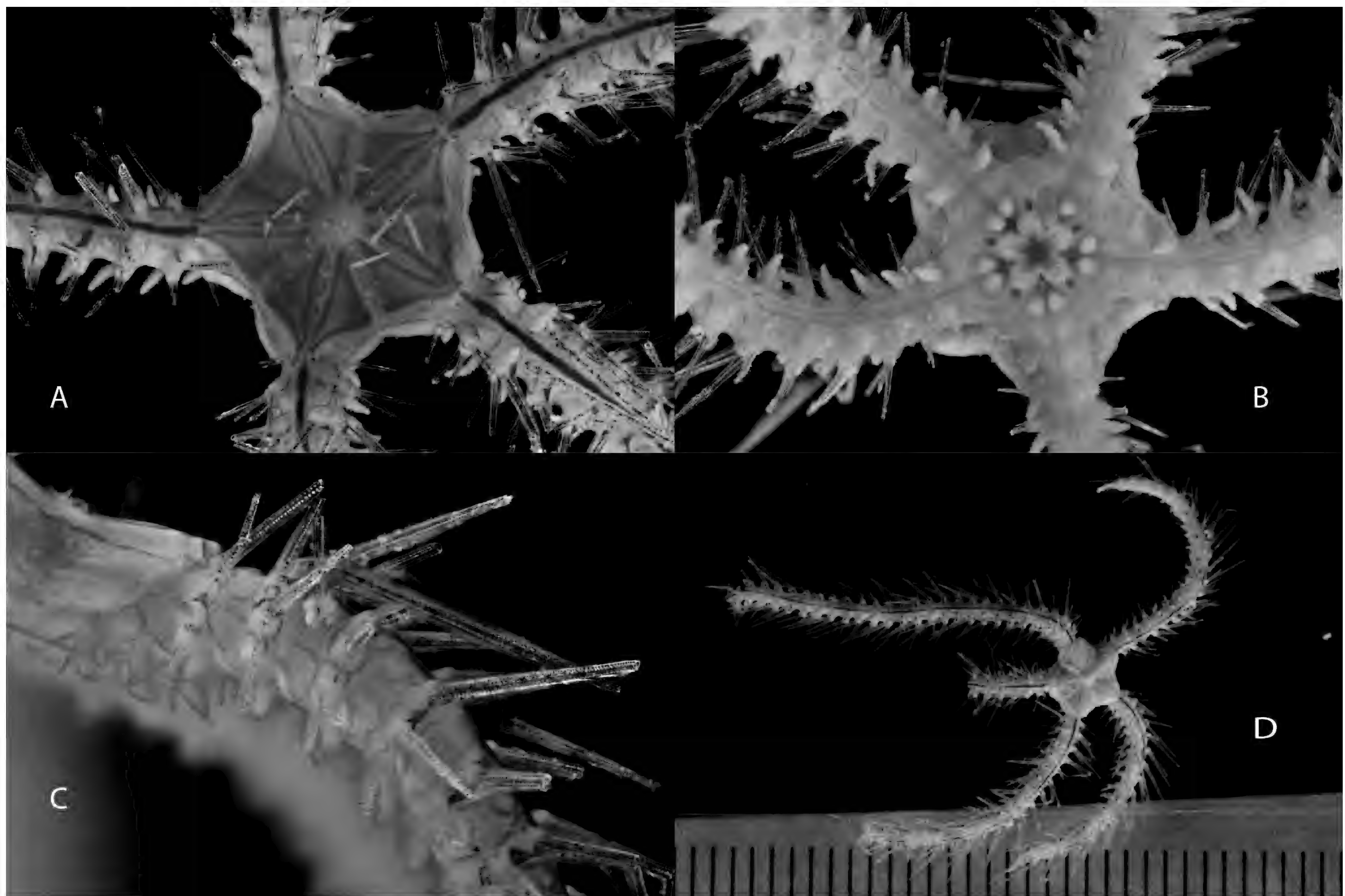


Figure 82. *Ophiothrix purpurea*. (A-D) NMV F308122 (Op 26, 4 mm dd) preserved, (A) dorsal, (B) ventral, (C) arm. (D) whole body.

Description of IOT material Disc pentagonal to 7 mm dd, covered in skin, except for the large radial shields, just separate; a few isolated slender and tall (1 mm) disc spines and some smaller conical spines; dorsal arm plates rhombic, separate, to 5 arm spines, lowest modified into a hook, a strong dark red line is present along the dorsal arm, some reddish markings next to and on the arm spines, some segments darker coloured, a dual light red stripe is present ventrally, the disc is tan coloured with darker makings around the radial shields, disc spines can be banded.

Taxonomic remarks Specimens with a series of dark dots down the arms rather than a line are known as *O. deceptor*. DNA evidence indicates that specimens of *O. purpurea* and *O. deceptor* form a discrete clade related to other epizoic genera such as *Ophiogymna* and *Ophiothela*, and not related to the type species (*O. suenisoni*) of the subgenus *Acanthophiothrix*, where they were previously placed (Christodoulou *et al.*, 2019).

Distribution Indo-West Pacific from South Africa to Pitcairn Islands, Japan south to New South Wales (1–

278 m), IOT (111–121 m).

Ecology and life history Epizoic on sponges and corals.

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<i>Amphiophiura spatulifera</i>	16	<i>Ophiomusa fallax</i>	10
<i>Amphiophiura urbana</i>	17	<i>Ophiomusa lymani</i>	11
<i>Amphiophiura</i> sp.MoV.7343	13	<i>Ophiomyces delata</i>	33
<i>Amphioplus</i> (<i>Lymanella</i>) cf. <i>integer</i>	66	<i>Ophionereis thryptica</i>	81
<i>Amphioplus conductus</i>	67	<i>Ophionereis</i> cf. <i>porrecta</i>	79
<i>Amphiura luetkeni</i>	70	<i>Ophionereis</i> sp.MoV.7352	80
<i>Amphiura</i> cf. <i>demissa</i>	68	<i>Ophiopeza spinosa</i>	56
<i>Amphiura</i> cf. <i>glabra</i>	69	<i>Ophiophrixus</i> sp.MoV.7348	53
<i>Anthophiura granulata</i>	18	<i>Ophiophycis</i> cf. <i>gracilis</i>	8
<i>Asteronyx reticulata</i>	4	<i>Ophioplax</i> sp.MoV.7330	82
<i>Asteroschema horridum</i>	6	<i>Ophioplinthaca bythiaspis</i>	49
<i>Asteroschema</i> cf. <i>igloo</i>	7	<i>Ophioplinthaca globata</i>	50
<i>Astrodia duospina</i>	5	<i>Ophioplinthaca semele</i>	51
<i>Bathypectinura heros</i>	54	<i>Ophioplinthus</i> sp.MoV.7271	19
<i>Histampica</i> sp.MoV.7353	83	<i>Ophiopristis procera</i>	57
<i>Ophiacantha composita</i>	38	<i>Ophiopristis shenhaiyongshii</i>	58
<i>Ophiacantha exilis</i>	39	<i>Ophiopristis vestita</i>	59
<i>Ophiacantha fuscina</i>	41	<i>Ophiopyrgus trispinosus</i>	20
<i>Ophiacantha longidens</i>	42	<i>Ophiosabine</i> sp.MoV.7347	52
<i>Ophiacantha pacata</i>	43	<i>Ophiosphalma fimbriatum</i>	27
<i>Ophiacantha pentagona</i>	44	<i>Ophiosphalma laqueatum</i>	28
<i>Ophiacantha</i> cf. <i>funnebris</i>	40	<i>Ophiosphalma</i> sp.MoV.7325	29
<i>Ophiactis brachygens</i>	73	<i>Ophiotholia spathifer</i>	34
<i>Ophiactis hirta</i>	76	<i>Ophiothrix purpurea</i>	84
<i>Ophiactis perplexa</i>	75	<i>Ophiotreta stimulea</i>	61
<i>Ophiactis plana</i>	77	<i>Ophiotreta</i> sp.MoV.7349	60
<i>Ophiambix aculeatus</i>	35	<i>Ophiotypa simplex</i>	78
<i>Ophientrema scolopendrica</i>	45	<i>Ophiura aequalis</i>	31
<i>Ophiernus adpersus</i>	63	<i>Ophiura micracantha</i>	32
<i>Ophiernus vallincola</i>	64	<i>Ophiuroglypha clemens</i>	21
<i>Ophiocanops</i> sp.MoV.7346	46	<i>Ophiuroglypha orbiculata</i>	23
<i>Ophiocreas oedipus</i>	8	<i>Ophiuroglypha</i> cf. <i>irrorata</i>	22
<i>Ophiolebes</i> cf. <i>comatulina</i>	47	<i>Ophiuroglypha</i> sp.MoV.7273	24
<i>Ophioleuce brevispinum</i>	65	<i>Ophiuroglypha</i> sp.MoV.7344	25
<i>Ophiolycus pertinax</i>	36	<i>Perlophiura profundissima</i>	30
<i>Ophiomastus</i> sp.MoV.5228	72	<i>Stegophiura</i> sp.MoV.7272	26
<i>Ophiomastus</i> sp.MoV.7351	71	<i>Ophioscolecidae</i> sp.MoV.7345	37

Appendix - Ophiuroidea from voyages IN2021_V04 and IN2022_V08 to the Australian Christmas Island and Cocos (Keeling) Islands Territories

Species name	Family	Order	Operation	Accession no	Num	Reg. no
<i>Asteronyx reticulata</i>	Asteronychidae	Euryalida	IN2021_V04 5	148	1	NMV F 305585
<i>Astrodia duospina</i>	Asteronychidae	Euryalida	IN2021_V04 26	136	4	NMV F 305533
<i>Astrodia duospina</i>	Asteronychidae	Euryalida	IN2021_V04 26	136	1	NMV F 305622
<i>Astrodia duospina</i>	Asteronychidae	Euryalida	IN2021_V04 28	115	2	NMV F 305534
<i>Astrodia duospina</i>	Asteronychidae	Euryalida	IN2021_V04 31	104	1	NMV F 305535
<i>Astrodia duospina</i>	Asteronychidae	Euryalida	IN2021_V04 31	160	4	NMV F 305536
<i>Astrodia duospina</i>	Asteronychidae	Euryalida	IN2021_V04 33	113	1	NMV F 305542
<i>Astrodia duospina</i>	Asteronychidae	Euryalida	IN2021_V04 50	131	1	NMV F 305597
<i>Astrodia duospina</i>	Asteronychidae	Euryalida	IN2021_V04 7	103	1	NMV F 305523
<i>Astrodia duospina</i>	Asteronychidae	Euryalida	IN2022_V08 105	144	3	NMV F 305788
<i>Astrodia duospina</i>	Asteronychidae	Euryalida	IN2022_V08 113	128	3	NMV F 305804
<i>Astrodia duospina</i>	Asteronychidae	Euryalida	IN2022_V08 115	136	8	NMV F 305806
<i>Astrodia duospina</i>	Asteronychidae	Euryalida	IN2022_V08 116	109, 167, 179	4	NMV F 308024
<i>Astrodia duospina</i>	Asteronychidae	Euryalida	IN2022_V08 117	110	1	NMV F 308031
<i>Astrodia duospina</i>	Asteronychidae	Euryalida	IN2022_V08 131	206	3	NMV F 308047
<i>Astrodia duospina</i>	Asteronychidae	Euryalida	IN2022_V08 153	139	9	NMV F 308080
<i>Astrodia duospina</i>	Asteronychidae	Euryalida	IN2022_V08 181	114	1	NMV F 308125
<i>Astrodia duospina</i>	Asteronychidae	Euryalida	IN2022_V08 185	109	5	NMV F 308132
<i>Astrodia duospina</i>	Asteronychidae	Euryalida	IN2022_V08 189	115	9	NMV F 308134
<i>Asteroschema horridum</i>	Euryalidae	Euryalida	IN2021_V04 13	103	1	MV
<i>Asteroschema horridum</i>	Euryalidae	Euryalida	IN2021_V04 22	104 & 105	2	MV
<i>Asteroschema horridum</i>	Euryalidae	Euryalida	IN2021_V04 5	105	2	NMV F 305583
<i>Asteroschema horridum</i>	Euryalidae	Euryalida	IN2022_V08 143	122 & 103	15	NMV F 308060
<i>Asteroschema cf. igloo</i>	Euryalidae	Euryalida	IN2021_V04 48	109	1	NMV F 305590
<i>Ophiocreas oedipus</i>	Euryalidae	Euryalida	IN2021_V04 26	106	1	NMV F 305598
<i>Ophiophycis cf. gloriensis</i>	Astrophieuridae	Ophiurida	IN2022_V08 128	G	1	NMV F 309510
<i>Ophiophycis cf. gloriensis</i>	Astrophieuridae	Ophiurida	IN2022_V08 163	200	3	NMV F 308102
<i>Ophiomusa facunda</i>	Ophiomusaidae	Ophiurida	IN2022_V08 161	199	1	NMV F 308105
<i>Ophiomusa facunda</i>	Ophiomusaidae	Ophiurida	IN2022_V08 163	157	1	NMV F 308089
<i>Ophiomusa facunda</i>	Ophiomusaidae	Ophiurida	IN2022_V08 165	146	1	NMV F 308106
<i>Ophiomusa fallax</i>	Ophiomusaidae	Ophiurida	IN2021_V04 5	118	1	NMV F 305624
<i>Ophiomusa fallax</i>	Ophiomusaidae	Ophiurida	IN2021_V04 5	118	5	NMV F 305518
<i>Ophiomusa fallax</i>	Ophiomusaidae	Ophiurida	IN2022_V08 128	133	2	NMV F 308041
<i>Ophiomusa fallax</i>	Ophiomusaidae	Ophiurida	IN2022_V08 163	194	4	NMV F 308093
<i>Ophiomusa fallax</i>	Ophiomusaidae	Ophiurida	IN2022_V08 176	126	1	NMV F 308118
<i>Ophiomusa lymani</i>	Ophiomusaidae	Ophiurida	IN2021_V04 12	107 & 109	2	NMV F 272392
<i>Ophiomusa lymani</i>	Ophiomusaidae	Ophiurida	IN2021_V04 26	138	119	NMV F 305531
<i>Ophiomusa lymani</i>	Ophiomusaidae	Ophiurida	IN2021_V04 26	137	1	NMV F 305532
<i>Ophiomusa lymani</i>	Ophiomusaidae	Ophiurida	IN2021_V04 26	138	1	NMV F 305611
<i>Ophiomusa lymani</i>	Ophiomusaidae	Ophiurida	IN2022_V08 113	124	125	NMV F 305800
<i>Ophiomusa lymani</i>	Ophiomusaidae	Ophiurida	IN2022_V08 113	124	120	NMV F 305799
<i>Ophiomusa lymani</i>	Ophiomusaidae	Ophiurida	IN2022_V08 116	178 & 181	48	NMV F 308028
<i>Ophiomusa lymani</i>	Ophiomusaidae	Ophiurida	IN2022_V08 117	120 & 119	7	NMV F 308030
<i>Ophiomusa lymani</i>	Ophiomusaidae	Ophiurida	IN2022_V08 131	209	1	NMV F 308049
<i>Amphiophiura bullata</i>	Ophiopyrgidae	Ophiurida	IN2022_V08 122	199	15	NMV F 307639
<i>Amphiophiura bullata</i>	Ophiopyrgidae	Ophiurida	IN2022_V08 196	111	17	NMV F 307660
<i>Amphiophiura insolita</i>	Ophiopyrgidae	Ophiurida	IN2021_V04 5	143	1	NMV F 305623
<i>Amphiophiura insolita</i>	Ophiopyrgidae	Ophiurida	IN2021_V04 5	143	6	NMV F 193465
<i>Amphiophiura insolita</i>	Ophiopyrgidae	Ophiurida	IN2022_V08 138	114	3	NMV F 308054
<i>Amphiophiura insolita</i>	Ophiopyrgidae	Ophiurida	IN2022_V08 163	123	50	NMV F 308088
<i>Amphiophiura insolita</i>	Ophiopyrgidae	Ophiurida	IN2022_V08 167	114	3	NMV F 308103
<i>Amphiophiura laudata</i>	Ophiopyrgidae	Ophiurida	IN2021_V04 5	146	1	NMV F 305612

Species name	Family	Order	Operation	Accession no	Num	Reg. no
<i>Amphiophiura laudata</i>	Ophiopyrgidae	Ophiurida	IN2021_V04 5	146	22	NMV F 305582
<i>Amphiophiura laudata</i>	Ophiopyrgidae	Ophiurida	IN2022_V08 138	115	1	NMV F 308053
<i>Amphiophiura laudata</i>	Ophiopyrgidae	Ophiurida	IN2022_V08 159	162	1	NMV F 308085
<i>Amphiophiura laudata</i>	Ophiopyrgidae	Ophiurida	IN2022_V08 163	195	2	NMV F 308092
<i>Amphiophiura laudata</i>	Ophiopyrgidae	Ophiurida	IN2022_V08 167	115	2	NMV F 308104
<i>Amphiophiura</i> sp.MoV.7343	Ophiopyrgidae	Ophiurida	IN2022_V08 108	134	1	NMV F 307630
<i>Amphiophiura spatulifera</i>	Ophiopyrgidae	Ophiurida	IN2021_V04 9	128	1	NMV F 305565
<i>Amphiophiura urbana</i>	Ophiopyrgidae	Ophiurida	IN2021_V04 16	115	1	NMV F 305551
<i>Amphiophiura urbana</i>	Ophiopyrgidae	Ophiurida	IN2021_V04 18	131	1	NMV F 305628
<i>Amphiophiura urbana</i>	Ophiopyrgidae	Ophiurida	IN2021_V04 18	131	3	NMV F 305577
<i>Amphiophiura urbana</i>	Ophiopyrgidae	Ophiurida	IN2021_V04 20	103	1	NMV F 305560
<i>Anthophiura granulata</i>	Ophiopyrgidae	Ophiurida	IN2022_V08 103	170G	3	NMV F 305783
<i>Anthophiura granulata</i>	Ophiopyrgidae	Ophiurida	IN2022_V08 120	175	1	NMV F 308032
<i>Anthophiura granulata</i>	Ophiopyrgidae	Ophiurida	IN2022_V08 120	G	1	NMV F 309520
<i>Ophioplinthus</i> sp.MoV.7271	Ophiopyrgidae	Ophiurida	IN2021_V04 26	134	9	NMV F 305530
<i>Ophioplinthus</i> sp.MoV.7271	Ophiopyrgidae	Ophiurida	IN2021_V04 28	170	16	NMV F 305601
<i>Ophioplinthus</i> sp.MoV.7271	Ophiopyrgidae	Ophiurida	IN2021_V04 31	155	19	NMV F 305540
<i>Ophioplinthus</i> sp.MoV.7271	Ophiopyrgidae	Ophiurida	IN2021_V04 33	112	1	NMV F 305543
<i>Ophioplinthus</i> sp.MoV.7271	Ophiopyrgidae	Ophiurida	IN2021_V04 50	130	1500	NMV F 305602
<i>Ophioplinthus</i> sp.MoV.7271	Ophiopyrgidae	Ophiurida	IN2021_V04 50	130	2	NMV F 305609
<i>Ophioplinthus</i> sp.MoV.7271	Ophiopyrgidae	Ophiurida	IN2021_V04 50	130	1500	NMV F 305603
<i>Ophioplinthus</i> sp.MoV.7271	Ophiopyrgidae	Ophiurida	IN2021_V04 52	101 & 103	11	NMV F 305596
<i>Ophioplinthus</i> sp.MoV.7271	Ophiopyrgidae	Ophiurida	IN2022_V08 105	148	500	NMV F 305792
<i>Ophioplinthus</i> sp.MoV.7271	Ophiopyrgidae	Ophiurida	IN2022_V08 105	148	500	NMV F 305791
<i>Ophioplinthus</i> sp.MoV.7271	Ophiopyrgidae	Ophiurida	IN2022_V08 113	127	1	NMV F 305803
<i>Ophiopyrgus trispinosus</i>	Ophiopyrgidae	Ophiurida	IN2021_V04 5	118	1	NMV F 305625
<i>Ophiopyrgus trispinosus</i>	Ophiopyrgidae	Ophiurida	IN2021_V04 5	118	2	NMV F 305516
<i>Ophiuroglypha clemens</i>	Ophiopyrgidae	Ophiurida	IN2021_V04 22	121	1	NMV F 305564
<i>Ophiuroglypha clemens</i>	Ophiopyrgidae	Ophiurida	IN2021_V04 9	128	2	NMV F 305567
<i>Ophiuroglypha clemens</i>	Ophiopyrgidae	Ophiurida	IN2021_V04 9	128	1	NMV F 305627
<i>Ophiuroglypha irrorata concreta</i>	Ophiopyrgidae	Ophiurida	IN2021_V04 28	125	4	NMV F 272391
<i>Ophiuroglypha irrorata concreta</i>	Ophiopyrgidae	Ophiurida	IN2021_V04 33	115	1	NMV F 305631
<i>Ophiuroglypha irrorata concreta</i>	Ophiopyrgidae	Ophiurida	IN2021_V04 50	132	1	NMV F 305594
<i>Ophiuroglypha irrorata concreta</i>	Ophiopyrgidae	Ophiurida	IN2022_V08 147	125	8	NMV F 308069
<i>Ophiuroglypha irrorata involuta</i>	Ophiopyrgidae	Ophiurida	IN2022_V08 115	137	4	NMV F 305807
<i>Ophiuroglypha irrorata involuta</i>	Ophiopyrgidae	Ophiurida	IN2022_V08 145	111	4	NMV F 307643
<i>Ophiuroglypha irrorata involuta</i>	Ophiopyrgidae	Ophiurida	IN2022_V08 151	112 & 136	4	NMV F 308077
<i>Ophiuroglypha irrorata orbiculata</i>	Ophiopyrgidae	Ophiurida	IN2021_V04 12	108	3	NMV F 305514
<i>Ophiuroglypha irrorata orbiculata</i>	Ophiopyrgidae	Ophiurida	IN2021_V04 26	140	3	NMV F 305529
<i>Ophiuroglypha irrorata orbiculata</i>	Ophiopyrgidae	Ophiurida	IN2021_V04 28	125	31	NMV F 272390
<i>Ophiuroglypha irrorata orbiculata</i>	Ophiopyrgidae	Ophiurida	IN2021_V04 31	154	1	NMV F 305630
<i>Ophiuroglypha irrorata orbiculata</i>	Ophiopyrgidae	Ophiurida	IN2021_V04 31	154	15	NMV F 305539
<i>Ophiuroglypha irrorata orbiculata</i>	Ophiopyrgidae	Ophiurida	IN2021_V04 33	115	12	NMV F 272389
<i>Ophiuroglypha irrorata orbiculata</i>	Ophiopyrgidae	Ophiurida	IN2021_V04 50	132	3	NMV F 305595
<i>Ophiuroglypha irrorata orbiculata</i>	Ophiopyrgidae	Ophiurida	IN2022_V08 105	143	1	NMV F 305787
<i>Ophiuroglypha irrorata orbiculata</i>	Ophiopyrgidae	Ophiurida	IN2022_V08 113	125	34	NMV F 305801
<i>Ophiuroglypha irrorata orbiculata</i>	Ophiopyrgidae	Ophiurida	IN2022_V08 116	177	24	NMV F 307635
<i>Ophiuroglypha irrorata orbiculata</i>	Ophiopyrgidae	Ophiurida	IN2022_V08 117	112	23	NMV F 307636
<i>Ophiuroglypha</i> sp.MoV.7273	Ophiopyrgidae	Ophiurida	IN2021_V04 13	114	1	NMV F 305573
<i>Ophiuroglypha</i> sp.MoV.7273	Ophiopyrgidae	Ophiurida	IN2021_V04 22	121	1	NMV F 305574
<i>Ophiuroglypha</i> sp.MoV.7273	Ophiopyrgidae	Ophiurida	IN2021_V04 35	126	1	NMV F 305546
<i>Ophiuroglypha</i> sp.MoV.7273	Ophiopyrgidae	Ophiurida	IN2021_V04 40	129	4	NMV F 305547
<i>Ophiuroglypha</i> sp.MoV.7273	Ophiopyrgidae	Ophiurida	IN2021_V04 46	121	1	NMV F 305629
<i>Ophiuroglypha</i> sp.MoV.7273	Ophiopyrgidae	Ophiurida	IN2021_V04 46	121	12	NMV F 305589
<i>Ophiuroglypha</i> sp.MoV.7273	Ophiopyrgidae	Ophiurida	IN2021_V04 48	131	1	NMV F 305593
<i>Ophiuroglypha</i> sp.MoV.7273	Ophiopyrgidae	Ophiurida	IN2022_V08 108	131G	1	NMV F 305795
<i>Ophiuroglypha</i> sp.MoV.7344	Ophiopyrgidae	Ophiurida	IN2021_V04 28	109	1	NMV F 305600
<i>Ophiuroglypha</i> sp.MoV.7344	Ophiopyrgidae	Ophiurida	IN2021_V04 33	114	1	NMV F 305599

Species name	Family	Order	Operation	Accession no	Num	Reg. no
<i>Ophiuroglypha</i> sp.MoV.7344	Ophiopyrgidae	Ophiurida	IN2022_V08 145	113	7	NMV F 308073
<i>Ophiuroglypha</i> sp.MoV.7344	Ophiopyrgidae	Ophiurida	IN2022_V08 147	128	3	NMV F 308071
<i>Ophiuroglypha</i> sp.MoV.7344	Ophiopyrgidae	Ophiurida	IN2022_V08 151	112	1	NMV F 308078
<i>Stegophiura</i> sp.MoV.7272	Ophiopyrgidae	Ophiurida	IN2021_V04 26	135	56	NMV F 193466
<i>Stegophiura</i> sp.MoV.7272	Ophiopyrgidae	Ophiurida	IN2021_V04 26	135	1	NMV F 305618
<i>Stegophiura</i> sp.MoV.7272	Ophiopyrgidae	Ophiurida	IN2021_V04 31	152	27	NMV F 193469
<i>Stegophiura</i> sp.MoV.7272	Ophiopyrgidae	Ophiurida	IN2021_V04 35	123	61	NMV F 272385
<i>Stegophiura</i> sp.MoV.7272	Ophiopyrgidae	Ophiurida	IN2021_V04 37	142, 143, 149	129	NMV F 305525
<i>Stegophiura</i> sp.MoV.7272	Ophiopyrgidae	Ophiurida	IN2021_V04 40	131	10	NMV F 272383
<i>Stegophiura</i> sp.MoV.7272	Ophiopyrgidae	Ophiurida	IN2021_V04 46	122	34	NMV F 305588
<i>Stegophiura</i> sp.MoV.7272	Ophiopyrgidae	Ophiurida	IN2021_V04 48	131	26	NMV F 305592
<i>Stegophiura</i> sp.MoV.7272	Ophiopyrgidae	Ophiurida	IN2021_V04 53	104, 113, 114	3	NMV F 272386
<i>Stegophiura</i> sp.MoV.7272	Ophiopyrgidae	Ophiurida	IN2022_V08 105	141	43	NMV F 305785
<i>Stegophiura</i> sp.MoV.7272	Ophiopyrgidae	Ophiurida	IN2022_V08 108	135	3	NMV F 305794
<i>Stegophiura</i> sp.MoV.7272	Ophiopyrgidae	Ophiurida	IN2022_V08 113	126	98	NMV F 305802
<i>Stegophiura</i> sp.MoV.7272	Ophiopyrgidae	Ophiurida	IN2022_V08 116	175	42	NMV F 308027
<i>Stegophiura</i> sp.MoV.7272	Ophiopyrgidae	Ophiurida	IN2022_V08 117	118	3	NMV F 308026
<i>Stegophiura</i> sp.MoV.7272	Ophiopyrgidae	Ophiurida	IN2022_V08 131	208	3	NMV F 308048
<i>Stegophiura</i> sp.MoV.7272	Ophiopyrgidae	Ophiurida	IN2022_V08 143	189	1	NMV F 308062
<i>Stegophiura</i> sp.MoV.7272	Ophiopyrgidae	Ophiurida	IN2022_V08 149	104	2	NMV F 308068
<i>Stegophiura</i> sp.MoV.7272	Ophiopyrgidae	Ophiurida	IN2022_V08 153	138	49	NMV F 308079
<i>Stegophiura</i> sp.MoV.7272	Ophiopyrgidae	Ophiurida	IN2022_V08 157	102	2	NMV F 308083
<i>Stegophiura</i> sp.MoV.7272	Ophiopyrgidae	Ophiurida	IN2022_V08 185	114	26	NMV F 308130
<i>Stegophiura</i> sp.MoV.7272	Ophiopyrgidae	Ophiurida	IN2022_V08 189	114	10	NMV F 308341
<i>Ophiosphalma</i> A174	Ophiosphalmidae	Ophiurida	IN2022_V08 189	G	2	NMV F 309511
<i>Ophiosphalma fimbriatum</i>	Ophiosphalmidae	Ophiurida	IN2021_V04 28	114	1	NMV F 305632
<i>Ophiosphalma fimbriatum</i>	Ophiosphalmidae	Ophiurida	IN2021_V04 28	114	47	NMV F 193470
<i>Ophiosphalma fimbriatum</i>	Ophiosphalmidae	Ophiurida	IN2021_V04 31	162	1	NMV F 305537
<i>Ophiosphalma fimbriatum</i>	Ophiosphalmidae	Ophiurida	IN2021_V04 50	133	1	NMV F 272384
<i>Ophiosphalma fimbriatum</i>	Ophiosphalmidae	Ophiurida	IN2022_V08 105	142	3	NMV F 305786
<i>Ophiosphalma fimbriatum</i>	Ophiosphalmidae	Ophiurida	IN2022_V08 113	129	2	NMV F 307633
<i>Ophiosphalma fimbriatum</i>	Ophiosphalmidae	Ophiurida	IN2022_V08 115	139	25	NMV F 305808
<i>Ophiosphalma fimbriatum</i>	Ophiosphalmidae	Ophiurida	IN2022_V08 147	130	1	NMV F 307647
<i>Ophiosphalma fimbriatum</i>	Ophiosphalmidae	Ophiurida	IN2022_V08 181	113	11	NMV F 308124
<i>Ophiosphalma fimbriatum</i>	Ophiosphalmidae	Ophiurida	IN2022_V08 183	138	1	NMV F 308126
<i>Ophiosphalma fimbriatum</i>	Ophiosphalmidae	Ophiurida	IN2022_V08 185	114	1	NMV F 308131
<i>Ophiosphalma fimbriatum</i>	Ophiosphalmidae	Ophiurida	IN2022_V08 187	137	1	NMV F 308127
<i>Ophiosphalma fimbriatum</i>	Ophiosphalmidae	Ophiurida	IN2022_V08 189	126	5	NMV F 308133
<i>Ophiosphalma laqueatum</i>	Ophiosphalmidae	Ophiurida	IN2022_V08 170	101	1	NMV F 307653
<i>Ophiosphalma laqueatum</i>	Ophiosphalmidae	Ophiurida	IN2022_V08 170	102	5	NMV F 308108
<i>Ophiosphalma</i> sp.MoV.7325	Ophiosphalmidae	Ophiurida	IN2021_V04 16	115	1	NMV F 305552
<i>Ophiosphalma</i> sp.MoV.7325	Ophiosphalmidae	Ophiurida	IN2021_V04 18	131	2	NMV F 305578
<i>Ophiosphalma</i> sp.MoV.7325	Ophiosphalmidae	Ophiurida	IN2022_V08 163	199	2	NMV F 307650
<i>Ophiosphalma</i> sp.MoV.7325	Ophiosphalmidae	Ophiurida	IN2022_V08 176	111	1	NMV F 307654
<i>Perlophiura profundissima</i>	Ophiosphalmidae	Ophiurida	IN2022_V08 106	134G	1	NMV F 309522
<i>Perlophiura profundissima</i>	Ophiosphalmidae	Ophiurida	IN2022_V08 122	242G	1	NMV F 308033
<i>Ophiura aequalis</i>	Ophiuridae	Ophiurida	IN2021_V04 13	114	22	NMV F 305571
<i>Ophiura aequalis</i>	Ophiuridae	Ophiurida	IN2021_V04 2	102	9	NMV F 193468
<i>Ophiura aequalis</i>	Ophiuridae	Ophiurida	IN2021_V04 22	121	12	NMV F 305563
<i>Ophiura aequalis</i>	Ophiuridae	Ophiurida	IN2021_V04 35	124	1	NMV F 305619
<i>Ophiura aequalis</i>	Ophiuridae	Ophiurida	IN2021_V04 35	124	249	NMV F 305544
<i>Ophiura aequalis</i>	Ophiuridae	Ophiurida	IN2021_V04 37	141	3	NMV F 305526
<i>Ophiura aequalis</i>	Ophiuridae	Ophiurida	IN2021_V04 40	130	2500	NMV F 305549
<i>Ophiura aequalis</i>	Ophiuridae	Ophiurida	IN2021_V04 46	128	241	NMV F 305550
<i>Ophiura aequalis</i>	Ophiuridae	Ophiurida	IN2021_V04 48	131	72	NMV F 305591
<i>Ophiura aequalis</i>	Ophiuridae	Ophiurida	IN2021_V04 9	128	1	NMV F 305566
<i>Ophiura aequalis</i>	Ophiuridae	Ophiurida	IN2022_V08 108	130	22	NMV F 305793
<i>Ophiura aequalis</i>	Ophiuridae	Ophiurida	IN2022_V08 108	133G	2	NMV F 308347

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<i>Ophiura aequalis</i>	Ophiuridae	Ophiurida	IN2022_V08 111	148G	1	NMV F 305798
<i>Ophiura aequalis</i>	Ophiuridae	Ophiurida	IN2022_V08 111	125	127	NMV F 305796
<i>Ophiura aequalis</i>	Ophiuridae	Ophiurida	IN2022_V08 143	190	17	NMV F 308063
<i>Ophiura aequalis</i>	Ophiuridae	Ophiurida	IN2022_V08 191	112	69	NMV F 308135
<i>Ophiura aequalis</i>	Ophiuridae	Ophiurida	IN2022_V08 195	118	35	NMV F 308128
<i>Ophiura micracantha</i>	Ophiuridae	Ophiurida	IN2021_V04 16	115	4	NMV F 305558
<i>Ophiura micracantha</i>	Ophiuridae	Ophiurida	IN2021_V04 16	115	1	NMV F 305626
<i>Ophiura micracantha</i>	Ophiuridae	Ophiurida	IN2021_V04 18	131	9	NMV F 305576
<i>Ophiura micracantha</i>	Ophiuridae	Ophiurida	IN2021_V04 20	103	4	NMV F 305559
<i>Ophiura micracantha</i>	Ophiuridae	Ophiurida	IN2022_V08 128	131	20	NMV F 308040
<i>Ophiura micracantha</i>	Ophiuridae	Ophiurida	IN2022_V08 131	207	1	NMV F 308046
<i>Ophiura micracantha</i>	Ophiuridae	Ophiurida	IN2022_V08 163	191	3	NMV F 308094
<i>Ophiura micracantha</i>	Ophiuridae	Ophiurida	IN2022_V08 193	109	8	NMV F 308138
Ophiohelidae A221(juvenile)	Ophiohelidae	Ophioscolecida	IN2022_V08 122	242G	1	NMV F 308034
<i>Ophiomyces delata</i>	Ophiohelidae	Ophioscolecida	IN2022_V08 108	132G	3	NMV F 307631
<i>Ophiomyces delata</i>	Ophiohelidae	Ophioscolecida	IN2022_V08 108	G	2	NMV F 308346
<i>Ophiomyces delata</i>	Ophiohelidae	Ophioscolecida	IN2022_V08 143	201	2	NMV F 307642
<i>Ophiomyces delata</i>	Ophiohelidae	Ophioscolecida	IN2022_V08 161	174	1	NMV F 307649
<i>Ophiotholia spathifer</i>	Ophiohelidae	Ophioscolecida	IN2022_V08 159	163	3	NMV F 307648
<i>Ophiotholia spathifer</i>	Ophiohelidae	Ophioscolecida	IN2022_V08 163	159	7	NMV F 307651
<i>Ophiambix aculeatus</i>	Ophioscolecidae	Ophioscolecida	IN2022_V08 113	196	3	NMV F 307632
<i>Ophiambix aculeatus</i>	Ophioscolecidae	Ophioscolecida	IN2022_V08 113	193	1	NMV F 308137
<i>Ophiambix aculeatus</i>	Ophioscolecidae	Ophioscolecida	IN2022_V08 147	126	7	NMV F 307645
<i>Ophiolycus pertinax</i>	Ophioscolecidae	Ophioscolecida	IN2021_V04 16	115	1	NMV F 305553
<i>Ophiolycus pertinax</i>	Ophioscolecidae	Ophioscolecida	IN2021_V04 18	131	6	NMV F 305580
<i>Ophiolycus pertinax</i>	Ophioscolecidae	Ophioscolecida	IN2021_V04 5	144	170	NMV F 305586
<i>Ophiolycus pertinax</i>	Ophioscolecidae	Ophioscolecida	IN2021_V04 5	144	1	NMV F 305617
<i>Ophiolycus pertinax</i>	Ophioscolecidae	Ophioscolecida	IN2021_V04 7	104 & 114	4	NMV F 305520
<i>Ophiolycus pertinax</i>	Ophioscolecidae	Ophioscolecida	IN2022_V08 163	160	5	NMV F 308091
Ophioscolecid sp.MoV.7345	Ophioscolecidae	Ophioscolecida	IN2021_V04 5	118	3	NMV F 305519
<i>Ophiacantha</i> (juvenile)	Ophiacanthidae	Ophiacanthida	IN2022_V08 126	165	1	NMV F 308340
<i>Ophiacantha</i> (juvenile)	Ophiacanthidae	Ophiacanthida	IN2022_V08 155	130	1	NMV F 308082
<i>Ophiacantha composita</i>	Ophiacanthidae	Ophiacanthida	IN2021_V04 28	113	5	NMV F 272394
<i>Ophiacantha composita</i>	Ophiacanthidae	Ophiacanthida	IN2021_V04 31	156	3	NMV F 305538
<i>Ophiacantha composita</i>	Ophiacanthidae	Ophiacanthida	IN2021_V04 33	111	1	NMV F 305621
<i>Ophiacantha composita</i>	Ophiacanthidae	Ophiacanthida	IN2021_V04 33	111	24	NMV F 305541
<i>Ophiacantha composita</i>	Ophiacanthidae	Ophiacanthida	IN2022_V08 105	145 & 189	4	NMV F 305789
<i>Ophiacantha composita</i>	Ophiacanthidae	Ophiacanthida	IN2022_V08 115	135	1	NMV F 305805
<i>Ophiacantha composita</i>	Ophiacanthidae	Ophiacanthida	IN2022_V08 147	127	1	NMV F 308070
<i>Ophiacantha exilis</i>	Ophiacanthidae	Ophiacanthida	IN2021_V04 40	132	8	NMV F 305548
<i>Ophiacantha exilis</i>	Ophiacanthidae	Ophiacanthida	IN2022_V08 191	114	3	NMV F 308136
<i>Ophiacantha funebris</i>	Ophiacanthidae	Ophiacanthida	IN2021_V04 37	140	1	NMV F 305528
<i>Ophiacantha fuscina</i>	Ophiacanthidae	Ophiacanthida	IN2021_V04 16	115	3	NMV F 305555
<i>Ophiacantha fuscina</i>	Ophiacanthidae	Ophiacanthida	IN2021_V04 9	128	1	NMV F 305570
<i>Ophiacantha fuscina</i>	Ophiacanthidae	Ophiacanthida	IN2022_V08 126	165	6	NMV F 308140
<i>Ophiacantha longidens</i>	Ophiacanthidae	Ophiacanthida	IN2022_V08 163	198	3	NMV F 308099
<i>Ophiacantha pacata</i>	Ophiacanthidae	Ophiacanthida	IN2021_V04 37	155	1	NMV F 305527
<i>Ophiacantha pentagona</i>	Ophiacanthidae	Ophiacanthida	IN2022_V08 128	G	5	NMV F 308345
<i>Ophiacantha pentagona</i>	Ophiacanthidae	Ophiacanthida	IN2022_V08 128	134 & 135	87	NMV F 308042
<i>Ophiacantha pentagona</i>	Ophiacanthidae	Ophiacanthida	IN2022_V08 163	193	2	NMV F 308098
<i>Ophiacantha pentagona</i>	Ophiacanthidae	Ophiacanthida	IN2022_V08 176	115	1	NMV F 308117
<i>Ophientrema scolopendrica</i>	Ophiacanthidae	Ophiacanthida	IN2021_V04 35	125	2	NMV F 305545
<i>Ophiocanops</i> sp.MoV.7346	Ophiacanthidae	Ophiacanthida	IN2022_V08 128	146	2	NMV F 308045
<i>Ophiohamus</i> (juvenile)	Ophiacanthidae	Ophiacanthida	IN2022_V08 136	174	1	NMV F 308076
<i>Ophiolebes</i> cf. <i>comatulina</i>	Ophiacanthidae	Ophiacanthida	IN2022_V08 134	106	1	NMV F 308051
<i>Ophiomoeris obstricta</i>	Ophiacanthidae	Ophiacanthida	IN2021_V04 5	118	1	NMV F 305517
<i>Ophiomoeris obstricta</i>	Ophiacanthidae	Ophiacanthida	IN2022_V08 126	175 & 176	6	NMV F 308037
<i>Ophiomoeris obstricta</i>	Ophiacanthidae	Ophiacanthida	IN2022_V08 128	136	5	NMV F 308043

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<i>Ophiomoeris obstricta</i>	Ophiacanthidae	Ophiacanthida	IN2022_V08 141	178 & 180	9	NMV F 308059
<i>Ophioplinthaca bythiaspis</i>	Ophiacanthidae	Ophiacanthida	IN2022_V08 131	215	1	NMV F 308050
<i>Ophioplinthaca globata</i>	Ophiacanthidae	Ophiacanthida	IN2021_V04 16	115	1	NMV F 305557
<i>Ophioplinthaca globata</i>	Ophiacanthidae	Ophiacanthida	IN2021_V04 5	145	6	NMV F 305587
<i>Ophioplinthaca globata</i>	Ophiacanthidae	Ophiacanthida	IN2021_V04 5	145	1	NMV F 305616
<i>Ophioplinthaca semele</i>	Ophiacanthidae	Ophiacanthida	IN2022_V08 126	169	1	NMV F 308036
<i>Ophiosabine</i> sp.MoV.7347	Ophiacanthidae	Ophiacanthida	IN2021_V04 16	115	1	NMV F 305556
<i>Ophiophrixus</i> sp.MoV.7348	Ophiobyrsidae	Ophiacanthida	IN2022_V08 163	167	1	NMV F 308342
<i>Bathypectinura heros</i>	Ophiodermatidae	Ophiacanthida	IN2021_V04 26	139	3	NMV F 272388
<i>Bathypectinura heros</i>	Ophiodermatidae	Ophiacanthida	IN2021_V04 31	153	1	NMV F 305610
<i>Bathypectinura heros</i>	Ophiodermatidae	Ophiacanthida	IN2021_V04 31	153	13	NMV F 272387
<i>Bathypectinura heros</i>	Ophiodermatidae	Ophiacanthida	IN2022_V08 113	130 & 131	25	NMV F 308023
<i>Bathypectinura heros</i>	Ophiodermatidae	Ophiacanthida	IN2022_V08 116	173	1	NMV F 308025
<i>Bathypectinura heros</i>	Ophiodermatidae	Ophiacanthida	IN2022_V08 116	180	5	NMV F 308029
<i>Bathypectinura heros</i>	Ophiodermatidae	Ophiacanthida	IN2022_V08 185	104	3	NMV F 308129
<i>Ophiopeza spinosa</i>	Ophiopezidae	Ophiacanthida	IN2022_V08 179	201	2	NMV F 308121
<i>Ophiomedeia</i> sp.MoV.7350	Ophiotomidae	Ophiacanthida	IN2022_V08 147	131	1	NMV F 308072
<i>Ophiopristis procera</i>	Ophiotomidae	Ophiacanthida	IN2022_V08 163	169	29	NMV F 308101
<i>Ophiopristis shenhaiyongshii</i>	Ophiotomidae	Ophiacanthida	IN2022_V08 141	165	1	NMV F 308056
<i>Ophiopristis vestita</i>	Ophiotomidae	Ophiacanthida	IN2022_V08 136	162	1	NMV F 308074
<i>Ophiopristis vestita</i>	Ophiotomidae	Ophiacanthida	IN2022_V08 161	176	5	NMV F 308087
<i>Ophiopristis vestita</i>	Ophiotomidae	Ophiacanthida	IN2022_V08 163	168	7	NMV F 308100
<i>Ophiopristis vestita</i>	Ophiotomidae	Ophiacanthida	IN2022_V08 176	114	1	NMV F 308116
<i>Ophiotreta</i> sp.MoV.7349	Ophiotomidae	Ophiacanthida	IN2021_V04 20	103	2	NMV F 305561
<i>Ophiotreta</i> sp.MoV.7349	Ophiotomidae	Ophiacanthida	IN2021_V04 5	149	1	NMV F 305613
<i>Ophiotreta</i> sp.MoV.7349	Ophiotomidae	Ophiacanthida	IN2021_V04 5	149	34	NMV F 305562
<i>Ophiotreta</i> sp.MoV.7349	Ophiotomidae	Ophiacanthida	IN2022_V08 128	124	2	NMV F 308039
<i>Ophiotreta</i> sp.MoV.7349	Ophiotomidae	Ophiacanthida	IN2022_V08 163	192	4	NMV F 308096
<i>Ophiotreta</i> sp.MoV.7349	Ophiotomidae	Ophiacanthida	IN2022_V08 176	113	1	NMV F 308115
<i>Ophiotreta stimulea</i>	Ophiotomidae	Ophiacanthida	IN2021_V04 18	131	4	NMV F 305575
<i>Ophiotreta stimulea</i>	Ophiotomidae	Ophiacanthida	IN2021_V04 5	141	36	NMV F 305584
<i>Ophiotreta stimulea</i>	Ophiotomidae	Ophiacanthida	IN2021_V04 5	141	1	NMV F 305614
<i>Ophiotreta stimulea</i>	Ophiotomidae	Ophiacanthida	IN2022_V08 126	165	2	NMV F 308139
<i>Ophiotreta stimulea</i>	Ophiotomidae	Ophiacanthida	IN2022_V08 141	164	1	NMV F 308055
<i>Ophiotreta stimulea</i>	Ophiotomidae	Ophiacanthida	IN2022_V08 161	175	5	NMV F 308086
<i>Ophiotreta stimulea</i>	Ophiotomidae	Ophiacanthida	IN2022_V08 163	197	5	NMV F 308097
<i>Ophiernus adpersus</i>	Ophiernidae	Ophioleucida	IN2021_V04 9	128	1	NMV F 305569
<i>Ophiernus adpersus</i>	Ophiernidae	Ophioleucida	IN2022_V08 131	213	2	NMV F 307640
<i>Ophiernus adpersus</i>	Ophiernidae	Ophioleucida	IN2022_V08 195	133	1	NMV F 307659
<i>Ophiernus vallincola</i>	Ophiernidae	Ophioleucida	IN2022_V08 145	114	22	NMV F 307644
<i>Ophioleuce</i> (juvenile)	Ophioleucidae	Ophioleucida	IN2022_V08 147	129	4	NMV F 307646
<i>Ophioleuce brevispinum</i>	Ophioleucidae	Ophioleucida	IN2022_V08 124	111	1	NMV F 308035
<i>Ophioleuce brevispinum</i>	Ophioleucidae	Ophioleucida	IN2022_V08 141	163	2	NMV F 307641
<i>Ophioleuce brevispinum</i>	Ophioleucidae	Ophioleucida	IN2022_V08 143	187	6	NMV F 308061
Ophioleucidae (juvenile)	Ophioleucidae	Ophioleucida	IN2022_V08 115	188G	1	NMV F 305809
Ophioleucidae (juvenile)	Ophioleucidae	Ophioleucida	IN2022_V08 120	178	1	NMV F 307637
<i>Ophiostriatus</i> (juvenile)	Ophioleucidae	Ophioleucida	IN2022_V08 128	G	1	NMV F 308348
<i>Ophiostriatus</i> (juvenile)	Ophioleucidae	Ophioleucida	IN2022_V08 187	G	1	NMV F 309515
<i>Ophiostriatus</i> (juvenile)	Ophioleucidae	Ophioleucida	IN2022_V08 189	G	1	NMV F 309512
<i>Amphioplus conductus</i>	Amphiuridae	Amphilepidida	IN2021_V04 13	114	2	NMV F 305572
<i>Amphioplus conductus</i>	Amphiuridae	Amphilepidida	IN2021_V04 2	103	3	NMV F 193467
<i>Amphioplus</i> cf. <i>integer</i>	Amphiuridae	Amphilepidida	IN2022_V08 172	104	1	NMV F 307656
<i>Amphiura</i> (juvenile)	Amphiuridae	Amphilepidida	IN2022_V08 143	202	1	NMV F 309521
<i>Amphiura</i> (juvenile)	Amphiuridae	Amphilepidida	IN2022_V08 172	127	5	NMV F 308112
<i>Amphiura</i> cf. <i>glabrum</i>	Amphiuridae	Amphilepidida	IN2022_V08 141	176 & 185	2	NMV F 308057
<i>Amphiura</i> cf. <i>demissa</i>	Amphiuridae	Amphilepidida	IN2021_V04 18	131	1	NMV F 305579
<i>Amphiura luetkeni</i>	Amphiuridae	Amphilepidida	IN2022_V08 179	197	5	NMV F 308123
<i>Ophiomastus</i> sp.MoV.5228	Hemieuryalidae	Amphilepidida	IN2021_V04 16	115	1	NMV F 305554

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<i>Ophiomastus</i> sp.MoV.5228	Hemieuryalidae	Amphilepidida	IN2021_V04 18	131	1	NMV F 305581
<i>Ophiomastus</i> sp.MoV.5228	Hemieuryalidae	Amphilepidida	IN2022_V08 128	138	1	NMV F 308044
<i>Ophiomastus</i> sp.MoV.7351	Hemieuryalidae	Amphilepidida	IN2021_V04 7	134	1	NMV F 305522
<i>Ophiomastus</i> sp.MoV.7351	Hemieuryalidae	Amphilepidida	IN2022_V08 105	225G	4	NMV F 305790
<i>Ophiomastus</i> sp.MoV.7351	Hemieuryalidae	Amphilepidida	IN2022_V08 105	139	11	NMV F 305784
<i>Ophiactis</i> (juvenile)	Ophiactidae	Amphilepidida	IN2022_V08 172	127	1	NMV F 308114
<i>Ophiactis definita</i>	Ophiactidae	Amphilepidida	IN2021_V04 5	142	1	NMV F 305615
<i>Ophiactis definita</i>	Ophiactidae	Amphilepidida	IN2021_V04 5	142	143	NMV F 305515
<i>Ophiactis definita</i>	Ophiactidae	Amphilepidida	IN2021_V04 7	113	1	NMV F 305521
<i>Ophiactis definita</i>	Ophiactidae	Amphilepidida	IN2022_V08 163	196	3	NMV F 308095
<i>Ophiactis hirta</i>	Ophiactidae	Amphilepidida	IN2022_V08 136	163 & 164	11	NMV F 308052
<i>Ophiactis perplexa</i>	Ophiactidae	Amphilepidida	IN2021_V04 37	157	1	NMV F 305524
<i>Ophiactis perplexa</i>	Ophiactidae	Amphilepidida	IN2021_V04 9	128	1	NMV F 305568
<i>Ophiactis perplexa</i>	Ophiactidae	Amphilepidida	IN2022_V08 111	127	1	NMV F 305797
<i>Ophiactis perplexa</i>	Ophiactidae	Amphilepidida	IN2022_V08 141	177	2	NMV F 308058
<i>Ophiactis perplexa</i>	Ophiactidae	Amphilepidida	IN2022_V08 143	203	1	NMV F 308066
<i>Ophiactis perplexa</i>	Ophiactidae	Amphilepidida	IN2022_V08 143	200	1	NMV F 308065
<i>Ophiactis perplexa</i>	Ophiactidae	Amphilepidida	IN2022_V08 143	200	1	NMV F 308064
<i>Ophiactis plana</i>	Ophiactidae	Amphilepidida	IN2022_V08 141	185	2	NMV F 308343
<i>Ophiactis plana</i>	Ophiactidae	Amphilepidida	IN2022_V08 165	142	2	NMV F 308107
<i>Ophiactis plana</i>	Ophiactidae	Amphilepidida	IN2022_V08 170	127	2	NMV F 308111
<i>Ophiotypa simplex</i>	Ophiolepididae	Amphilepidida	IN2021_V04 28	112	1	NMV F 305620
<i>Ophiotypa simplex</i>	Ophiolepididae	Amphilepidida	IN2021_V04 28	112	11	NMV F 272393
<i>Ophiotypa simplex</i>	Ophiolepididae	Amphilepidida	IN2022_V08 103	164	2	NMV F 307628
<i>Ophiotypa simplex</i>	Ophiolepididae	Amphilepidida	IN2022_V08 103	115	1	NMV F 307629
<i>Ophiotypa simplex</i>	Ophiolepididae	Amphilepidida	IN2022_V08 115	138	2	NMV F 307634
<i>Ophiotypa simplex</i>	Ophiolepididae	Amphilepidida	IN2022_V08 120	173	4	NMV F 307638
<i>Ophiotypa simplex</i>	Ophiolepididae	Amphilepidida	IN2022_V08 145	112	17	NMV F 308067
<i>Ophiotypa simplex</i>	Ophiolepididae	Amphilepidida	IN2022_V08 181	115	2	NMV F 307657
<i>Ophiotypa simplex</i>	Ophiolepididae	Amphilepidida	IN2022_V08 183	137	3	NMV F 307658
<i>Ophionereis porrecta</i>	Ophionereididae	Amphilepidida	IN2022_V08 179	198	2	NMV F 308119
<i>Ophionereis</i> sp.MoV.7352	Ophionereididae	Amphilepidida	IN2022_V08 172	102	1	NMV F 308113
<i>Ophionereis thryptica</i>	Ophionereididae	Amphilepidida	IN2022_V08 179	199	3	NMV F 308120
<i>Ophioplax</i> sp.MoV.7330	Ophionereididae	Amphilepidida	IN2022_V08 128	137	1	NMV F 308038
<i>Ophioplax</i> sp.MoV.7330	Ophionereididae	Amphilepidida	IN2022_V08 163	158	41	NMV F 308090
<i>Histampica</i> (juvenile)	Ophiothamnidae	Amphilepidida	IN2022_V08 170	112	2	NMV F 308109
<i>Histampica</i> (juvenile)	Ophiothamnidae	Amphilepidida	IN2022_V08 172	103	1	NMV F 308110
<i>Histampica</i> sp.MoV.7353	Ophiothamnidae	Amphilepidida	IN2022_V08 131	211	1	NMV F 308075
<i>Histampica</i> sp.MoV.7353	Ophiothamnidae	Amphilepidida	IN2022_V08 155	131	1	NMV F 308081
<i>Histampica</i> sp.MoV.7353	Ophiothamnidae	Amphilepidida	IN2022_V08 157	145	1	NMV F 308084
<i>Ophiothrix purpurea</i>	Ophiotrichidae	Amphilepidida	IN2022_V08 179	200	3	NMV F 308122